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JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

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THE SIXTY-SEVENTH ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN NEW YORK CITY, DURING THE WEEK BEGINNING AUGUST 25, 1919.

The American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will meet in New York City, August 25 and 26, and in joint session with Section on Education and Legislation A. Ph. A.
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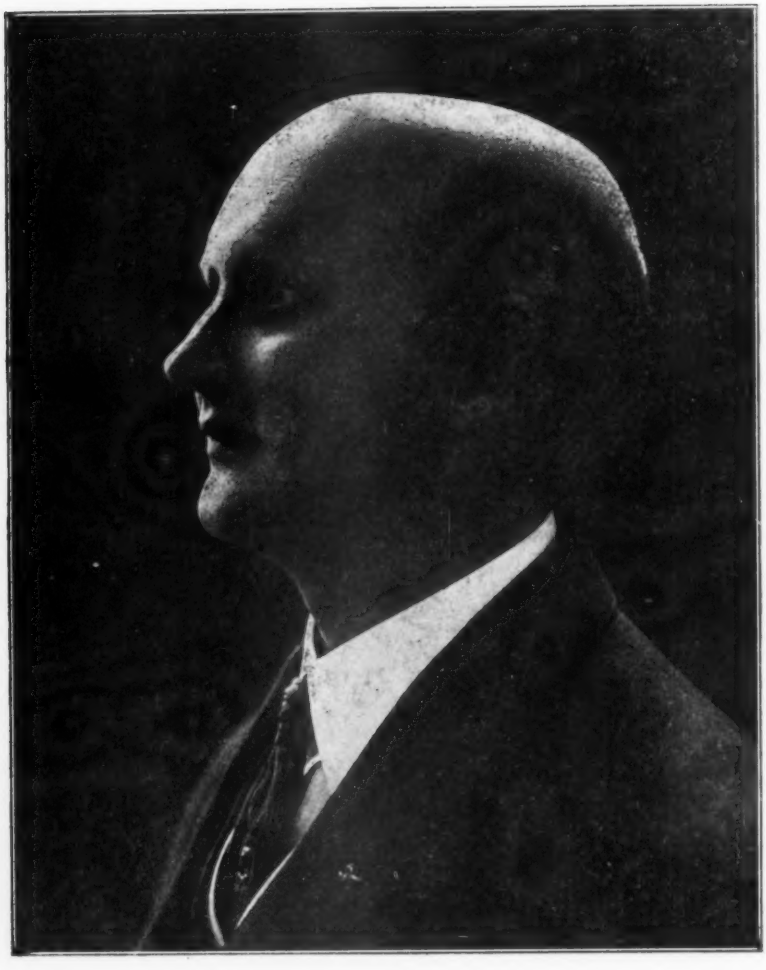

JOHN CULLEY

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. VIII MAY, 1919 NO. 5

JOHN CULLEY.

President John Culley, of the National Association of Boards of Pharmacy, was born in England forty-seven years ago, but before he had reached his teens he gave promise of becoming a citizen of the United States. The vacation periods of his school years were displaced by work in a drug store of Ogden, Utah, the adopted home of the subject of this brief sketch. In due time he secured the graduation credentials of the Ogden High School, which strengthened his desire for a pharmaceutical education. When John Culley graduated from the Philadelphia College of Pharmacy, in 1894, two other students from Utah were members of this class, and the trio were successful in carrying off all, or nearly all, the prizes of that year. One of the associates was Herman Harms, now Utah State Chemist, and the other George W. Luft, of New York City; the three are members of the American Pharmaceutical Association.

For several years Mr. Culley was one of the teaching staff of the Philadelphia College of Pharmacy, as assistant; thereafter he spent two years in New York City, gaining practical experience. Before returning permanently to the city of his adoption he worked for two years in Denver, and until he engaged in business on his own account, 15 or 16 years ago, he had charge of the prescription department in T. H. Carr's drug store, Ogden, Utah.

In 1908 Mr. Culley was appointed a member of the Utah Board of Pharmacy, which position he still holds. Prior to his election as President of the National Association of Boards of Pharmacy he held appointments on important committees and was honored with the office of Vice-President. Mr. Culley was President of the Utah Pharmaceutical Association, 1911–1912; he joined the American Pharmaceutical Association in 1908, and has ever since participated actively in its proceedings, seldom absenting himself from the annual conventions. Mrs. Culley usually accompanies her husband to these meetings and joins in the work of the Women's Section, of which organization she was the second presiding officer, 1914–1915.

Locally, Mr. and Mrs. Culley take a lively interest in social and civic affairs. Mr. Culley is highly regarded as an organizer, and his fellow citizens recognize these qualities as well as his pharmaceutical ability. His aim has been to advance pharmacy and give it not only the support of the laws but, what is more important, strengthen its purposes by the sustaining and uplifting influences of organized pharmacy.

E. G. E.

EDITORIAL

E. G. EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

THE DOCTORS AND THE DRUG ADDICTS.

AN editorial under above caption appeared in the *Philadelphia Public Ledger* of April 11, 1919:

"If the estimates of the health commissioner of New York City are to be accepted as even approaching accuracy, there are between 100,000 and 200,000 drug addicts in that city, victims of the criminal cupidity of a handful of disreputable physicians and druggists. A number of the doctors said to have been engaged in this traffic have been arrested, and an earnest effort is to be made not only to root out the evil but to deal humanely with the victims deprived of their usual narcotic by the arrests.

"This action of the New York authorities, in conjunction with officers of the Internal Revenue Service, is a forerunner of what will have to be done all over the country when the national prohibition laws go into effect. There can be no doubt that the drug habit on the part of those deprived of alcoholic stimulants will be enormously increased and that new measures will have to be taken to meet and combat an evil quite as serious as that against which the prohibition movement is directed. The federal and state laws regulating the sale of narcotics have made it more difficult for addicts to obtain the drugs for which they crave; but they have also enormously increased the incentive to violate the regulations.

"An enormous responsibility is placed upon the medical profession by these regulations, for it is chiefly by the connivance of unscrupulous doctors that addicts can obtain access to the forbidden drugs. Under these circumstances, it is incumbent upon the medical societies of the country to render the fullest coöperation to the end that the honor of the profession may be protected and the nation preserved from a scourge more deadly even than the drink evil. They may find it expedient to make radical modifications in their code of ethics, and especially in those rules governing the secrecy of the relations between the doctor and the criminal patient, for it is under the cover of that secrecy that the worst forms of malpractice flourish. That the laws must be made more strict than at present is probable; but the strictest law is not self-enforcing. The medical profession and the drug trade must rid themselves of the reproach of being the vehicle for and of taking toll from the perpetuation of a practice ruinous to health and morals and a growing menace to public safety."

Every drug addict should receive medical treatment. Few of them persist in efforts for the riddance of the affliction and practically all of them are easily persuaded to follow advice that causes them little or no inconvenience, hence, they are easy prey for medicasters. The place for drug addicts is in State institutions for the cure of the addiction. The drug addict receives little sympathy; he is entitled to much, for not infrequently he is victim, not transgressor, and by the time he becomes aware of his unfortunate condition he has lost control over self, and should be in charge of the State.

The purpose of the comment on the editorial, however, is to affirm that "the medical profession and the drug trade must rid themselves of the reproach of being the vehicle for and of taking toll from perpetuation of a practice ruinous to health and morals and a growing menace to public safety." It is a matter of deep concern that a handful of disreputables should bring reproach on the professions of medicine and pharmacy. It is time for closer coöperation between these

professions; an attitude which hinders the members in giving the best service is not just to the public.

We quote the following from an editorial of a recent issue of *Medical Council:*

"The druggist has been obliged to cater to demand, and the demand has been a matter largely beyond his control. He could not afford to stock goods he could not sell, and he could sell little but that which has been persistently advertised or that catered to public convenience or appetite."

We add, that the demand has often been created by prescriptions. That this is recognized is evident from the same editorial, the closing paragraphs of which read: "Treat the druggist as you would have him treat you, and perhaps a great many drug store abuses will soon be quickly righted; for the druggist is commonly just as good a man as you are.

"Don't try to oblige the fellow who wants liquor by asking the druggist to fill pint prescriptions for it, for the reputable druggist does not want that sort of business."

If the increase in drug addiction which has been reported from states where prohibition laws have become effective is a criterion, then the seriousness of the situation after July 1 becomes apparent.

The public has a right to expect and investigate the coöperation of professions, and to determine whether they are giving it the best service and protection possible. There is not only a widening field of medical science before us in which medicine and pharmacy should find much to do, but there are growing responsibilities in which they jointly share. The application of the Golden Rule in genuine service is possible only when the value of human life and health is placed above class distinction and material gain. E. G. E.

PENDING ASSOCIATION WORK FOR PHARMACISTS AND PHARMACY.

WAR conditions of last year interfered largely with association attendance; this year's conventions are to be Victory conclaves, the announcements for them are trumpet calls to duty. Never has there been so much legislation to discuss, so many radical changes in business affairs to consider, and important organization matters that demand attention.

Nineteen twenty is the centennial anniversary of the U. S. Pharmacopoeia; the first edition was published in 1820; the eleventh Pharmacopoeial convention will assemble in Washington in May of next year. While the Pharmacopoeia now in force is the ninth revision, it is the tenth edition; the title U. S. Pharmacopoeia X. would be correct and, perhaps, less confusing than the present designation.

State pharmaceutical associations should nominate their delegates to the Pharmacopoeial Convention this year as next year's meetings will, in most instances, be held after the first week of May. The selection of delegates is deserving of most

careful inquiry; there is much work to be done preparatory to a revision in which American drugs and chemicals will receive more consideration than heretofore. The chairman of the Revision Committee is Prof. Charles H. LaWall, whose address is 39 So. 10th Street, Philadelphia, Pa. The president of the Pharmacopoeial Convention is Dr. Harvey W. Wiley, Washington, D C.

Preparations will be made for the fifth edition of the National Formulary, at the New York Convention of the American Pharmaceutical Association. The revisions of these standards are of great moment to pharmacy in its various divisions, but there are other significant promotions that demand serious deliberations; not the least among these is the closer affiliation of State associations with the American Pharmaceutical Association in the House of Delegates. The need of united endeavor has been impressed and to neglect the opportunity, with the lesson so fresh in our memories, can be viewed only as unmindfulness of our own duties to ourselves and pharmacy. Chairman H. V. Arny, of the Federation Committee, has sent the messages of that active committee to the various associations; they should be given close study and made subjects for discussions and the conclusions reached should be conveyed to the House of Delegates by instructed representatives. The associations have also received printed copies of the transactions of the Chicago meeting of the House of Delegates, through Secretary Jeannot Hostmann.

The hopes of American men of science are for the establishment of a monumental research institute. The coöperation of the American Pharmaceutical Association and of the American Medical Association is essential in this work. The importance of pharmaceutical research is apparent to everyone and recently has been the subject of frequent editorial comments and papers in this JOURNAL. In this issue we reprint instead "A few comments on the proposed Institute for Drug Research" from the Chicago Chemical Bulletin for April:

A FEW COMMENTS ON THE PROPOSED INSTITUTE FOR DRUG RESEARCH.

"The proposed Institute for Drug Research has become current topic to readers of *The Journal of Industrial and Engineering Chemistry*. The proposal, as far as it embodies a happy compatibility between commercial and altruistic aims, is indeed worthy of the American Chemical Society. *The Bulletin* has refrained from taking a definite stand, but this in no way will hinder it from presenting its reflections. *The Bulletin* simply feels hesitant about recommending or condemning a project which has such potentialities either for good—or for harm.

"The chief agitators for the Institute for Drug Research appear to be influential members of the New York Section. Much praise is undoubtedly due them for endeavoring to create real work for real chemists. This must be the main object of the plan. Furthermore, the avowed intentions to keep Germany from regaining her former supremacy in synthetic drugs sold in America are accentuated by a practical form of patriotism. Increased American drug manufacture would also aid in more firmly re-entrenching the dye industry; by-products of the color works appeal to the investor as a legitimate means of necessary remunerative returns.

"Has the situation been handled in a manner productive of the best results? We grant the excellence of the above premises; we note carefully the post-war 'key' in this enterprise as in many other national undertakings; the open sesame that bares the objects of the Institute

to the glory of 'humanity.' With all these commendable expressions, why do the promoters not rise to a plane of true altruism and propose that the Institute be a coöperative agency, actually unifying the best elements of chemistry, pharmacy, and medicine? What good purpose or what logic is served in the insistence on keeping the Institute rigidly under the control of the American Chemical Society? The American Pharmaceutical Association admits that it has not been successful in fostering 'Pharmaceutical Research.' The Americam Medical Association seemingly has not deemed it wise of itself to promulgate a coöperative quasi-commercial proposition. Yet the views of organized chemistry as reflected through the national journal convey the impression that the Institute under the chemists' trusteeship will assuredly be a success—being chemists we are endowed with an exceptional acumen.

"The really big thing is to create a recognized research center not controlled by any one group or element; an institute whose policies are formulated by men of experience in the various affiliated branches of medico-chemical sciences and willingly seek the advice of all coöperative agencies. The American Pharmaceutical Association or the American Medical Association cannot *by themselves* create a successful research establishment, but their help is essential. Cannot the American Chemical Society fulfill the manifest need for a drug-investigating laboratory by magnanimously utilizing its organs as the means of crystallizing the movement, irrespective of whether the latter remains under its total jurisdiction. Public health demands that evidence of supreme bigness out of which will rise a recognized national seat for critical drug research stripped of all professional or commercial pettishness and not dominated by any one group of scientists.

"The practical weakness of the propaganda has been the utter disregard of the attitude of physicians. It is necessary to remind the Eastern chemists that the whole fabric will disintegrate if the doctors do not receive seriously the pronuncio of all organized chemists' agency. The medical viewpoint is more essential for success than the combined laboratory arguments. Test-tube and animal experiments are of undoubted merit, but the average physician wants to know the total results of accurately controlled clinical tests. These can only be obtained with the close coöperation of the medical profession. The *Bulletin* has been surprised at the seeming disregard of organized medicine in the several meetings which have been held to discuss this subject and in the published opinions. Organized pharmacy has been consulted in some slight measure; but the absence of an official representation of the American Medical Association is at least surprising. Yet it is no secret that that Association has maintained since 1905 a Council on Pharmacy and Chemistry whose primary purpose is 'gathering and disseminating such information as will protect the medical profession in the prescribing of proprietary medicinal articles.' Surely the Council on Pharmacy and Chemistry (whose personnel needs no introduction) has a much keener grasp of the synthetic drug situation than the Mellon Institute or even the Rockefeller Institute, although the aid of the latter institutions should be very welcome.

"Even before 1914 American physicians were gradually freeing therapeutic measures from the overburden of numerous German synthetics and their numberless modifications. The demand had been artificially stimulated by clever advertising, especially in days before the profession could call on such men as Stieglitz, Long, Sollman, Hatcher, Hunt, Howland, Puckner, and others, for unprejudiced opinions on the efficacy of so-claimed wonderful chemical 'discoveries.' As the war progressed, the stocks of German-made drugs were gradually diminished; the shortage was felt considerably in only a few instances. The medical profession, as a whole, is more than grateful to be rid of most of these unessential drugs. To-day apparently no shortage exists, although only about a dozen formerly German-made synthetics are being manufactured here on a commercial scale. Due recognition has undoubtedly been accorded the American chemists for achievements of preparing the needed remedies—no easy task. The American chemist can only retain his warm feeling toward him by refraining from flooding the market with semi-scientific medicaments. To follow the footsteps of the Germans is to be misled. The synthetizing of chemicals—actuated solely by a commercial desire to capitalize by-products at the expense of unfortunate victims of sickness—is to be deprecated by all sincere thinking chemists. On the other hand, the improvement of well-known drugs, the seeking of new means of alleviation of disease, the discarding of pseudo-scientific theories of drug action can be done only in an institute such as has been outlined by some of the promotors, and freed from factional or predatory influence.

"Congratulations are due the American Chemical Society for the high type of men appointed on the committee for this proposed institute. Dr. John Abel, of New York, has made many valuable contributions to pharmacology and is an earnest scholar. Dr. Raymond Bacon, of Pittsburgh, enjoys considerable popularity, largely because of his influential executive affiliation at the Mellon Institute. The chief of the scientific staff of Eli Lilly & Co., Dr. Eldred, represents a pioneer drug firm of the Middle West. The selection of Dr. Charles Herty, of New York, the editor of our industrial journal, as chairman, is logical. Dr. Reid Hunt, Boston, formerly director of the Hygienic Laboratory, U. S. Public Health Service, possesses both a thorough knowledge of chemo-therapeutics and a most excellently balanced mind. Professor Treat Johnson, New Haven, Conn., has created an enviable reputation in organic research. Dr. F. A. Levene, Rockefeller Institute, New York, is well known in the fields of physiologic-chemistry, not only as a result of his own investigations, but also those of his able collaborators. The eighth member, Mr. F. O. Taylor, Detroit, has published articles on pharmacy, and is connected with the house of Parke, Davis & Co. The personnel argues well for the success of the propaganda, and any criticism which might be offered is that there is a lack of well-known and recognized pharmaceutical chemists. The statements in favor of the Institute have been well brought out in the *Journal of Industrial and Engineering Chemistry*, and none should doubt the ultimate value to America of research stimulation. The wisdom, foresight, and courage which the committee possesses may be the means of finding a happy solution for the erection of a monumental research institute. Such are the hopes of American men of science."

PHARMACY, EDUCATION, AND SECTIONS IN PHARMACY.*

BY JOHN URI LLOYD, PHAR. M.

The Pharmacist.—According to the general definition of the word, a pharmacist is a maker or compounder of substances that are intended to be used as medicines. He may either delve deeply into the sciences that contribute to his art, or he may practically neglect them and still claim to be a pharmacist. He may either spend his spare time (for many pharmacists have leisure hours) in study or experimentation, or he may squander it in numerous directions that profit neither the mind nor the purse. In this article the term pharmacist is to be divorced from the lower of these connections and applied only to those persons who, as students, view their calling in the light of an exacting study, whether it be in immethodical experimentation or in systematic science research.

Natural Laws Dominate Pharmacy.—In this sense the conditions that control the physicist in his investigations concerning the various states of matter, become of vital importance to the thoughtful pharmacist as well. The investigations that have been made, and the studies yet to be made with liquids, solids, and gases, are a part of his heritage. The laws evolved by the study of chemistry, optics, physics, and especially physical chemistry, affiliate with the researches made and yet to be made in pharmacy fields.

It should not be forgotten, therefore, that in compounding pharmaceutical preparations, the laws that govern scientists generally must be considered, and that recondite phenomena in the broadest sense may be recognized if the operators

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* At the request of Dr. Charles Rice, in the latter part of the last century (1894), I wrote the first volume of a treatise entitled "A Study in Pharmacy." This work, comprising two hundred and twelve pages, was put into type and presented in fascicles, privately, to a limited circle of friends likely to be interested in the problems embraced therein. Otherwise, publication was not ventured. May I not hope that after its twenty-five years of slumber, this fragment, seemingly yet pertinent, may not prove a cumberer to pharmaceutical literature? J. U. L.

so incline. The too often accepted opinion that a man of inferior mental abilities, who cannot become a scientist in a special section, may yet be a qualified pharmacist, is refuted by the fact that pharmacy proper demands of its thoughtful and conscientious followers an extended knowledge of the general phenomena of science, and that the energy dissipated by many pharmacists on general subjects, if applied in a restricted field, would have made them conspicuous scientific men.

Popular Definition of the Term Pharmacist.—Formerly pharmacists were compelled by circumstances to make their own boluses, electuaries, confections, and other similar crude preparations, that comprised the major portion of the medicaments of the past. This fact established the early definition of the word Pharmacist, which, regardless of our special qualifications in modern science fields, still makes us in popular usage simply mixers of medicine, which inadequate definition passes currently, unchallenged, from dictionary to cyclopedia, as shown by the following recent citations:

PHARMACY.—"The art or practice of preparing, preserving and compounding medicines, and of dispensing them according to the Formulae or Prescriptions of Medical Practitioners."—*Century.*

PHARMACY.—"The art or practice of preparing, preserving and compounding substances for the purposes of medicine; the occupation of an apothecary."—*Webster.*

PHARMACY.—"The art of preparing and preserving and compounding substances to be used as medicines; the occupation of a druggist."—*Stormonth.*

In support of my opinion, such antiquated definitions as precede may be criticized as being true in substance but faulty in details. Those of our guild who appreciate the scope of our present labors and the depth to which our investigations may now often be carried, owe a duty to their comrades and themselves in the sense that a more comprehensive and broader definition of the term should be submitted to the revisers of these works. There are, now, branches in pharmacy; there has been an advancement in our art; and, regardless of the root or past meaning of the word, the foregoing expressions do not now correctly define our position.

"In Your Journey Look Not Backward."—That the compilers of modern dictionary definitions have not heeded the advice of the poet quoted in the preceding sentence is evident to persons who take the trouble to compare the definitions of pharmacy of the past with those of the present. Phraseology has been altered somewhat from time to time, perhaps to escape copyright infringements, but I fail to see any attempt at modernization. One hundred years ago the pharmacist occupied a very different position from that of the present, but not according to the dictionary, as is shown by the following excerpts, which are practically identical with definitions most recent and already cited:

PHARMACY.—"The art or practice of preparing medicines."—*Reed, 1845.*

PHARMACY.—"The art or practice of preparing medicines, the trade of an apothecary."—*Johnson, London, 1824.*

PHARMACY.—"That part of physic which teaches the choice and preparation of medicines, the apothecaries' art."—*Bailey, 1763.*

If such men as Dr. Charles Rice, C. Lewis Diehl, and Dr. Frederick Hoffmann were to be consulted by the revisers of our dictionaries, more comprehensive definitions of the general term Pharmacist would result. Probably the ancient generalization would be allowed to stand, but distinctions would be drawn be-

tween—the "Pharmacist" who dispenses; the "Druggist" (pharmacist) who sells in quantities and also prepares medicines but does not dispense; the "Manuturing Pharmacist" who neither retails nor dispenses, but who prepares medicines for dispensers and for physicians' use, and the "Theoretical Pharmacist" who studies phenomena connected with our art (and which is chiefly embraced in manipulation) who instructs students, but who perhaps neither dispenses nor prepares medicines—for we have these well recognized subdivisions now, as a part of our fraternity.

Listen.—Largely through the labors of pharmacists the science of chemistry arose. Linked closely with chemistry is the science of botany and the study of microscopy, and all along the chain we find engraved conspicuously the names of prominent pharmacists. The toilers in all branches of applied science have ever included a large proportion of pharmacists, and this is the condition still. The drudgery of empiricism, in the early day that was the immediate forerunner of the classified and connected sciences, was performed largely in the apothecary shop. And the impulse to discoveries that enrich the circle of the sciences has been often furnished by the humble manipulator of the mortar and pestle, who perhaps in many instances has never received that just credit which would, if applied as merited, raise him from obscurity to fame. Many of the conspicuous scientific discoverers of the world have drawn their inspirations from the apothecary, whom all feel free to consult, who advises, suggests, assists, and then when humanity receives the return, is too often neither mentioned nor recognized.

These facts are self-evident, and recognized by all students, and it is pleasant to observe that most true scientists cover with charity the errors and revere the memory of those who, amid unpleasant surroundings, toil and struggle as pioneers, and who, in the laborious field of empiricism, collect the facts that serve as a ground work for the exact science that follows: There are, however, much to their discredit, persons indebted to empiricism for their scientific conspicuity, who sneer at those who adhere to experimental investigation, as there are children who hold in contempt the methods of their parents, whose toil, privations, and sufferings gave a heritage of luxury to their favored and too often snobbish offspring.

The True Pharmacist.—While it is true that too many of our members are content to rest quiescent and unprogressive in the lower plane of our calling, (and so far as most such medicaments as have been mentioned are concerned, the purely traditional, as well as mechanical), or even have retrograded and are looking altogether to superficial, material, and financial results as the only object of the art, it is also true that others, in performing legitimate work, constantly enjoy the pleasures of study and of experimental investigation that reach far into science fields, and which furnish to the sympathetic manipulator many enticing and alluring attractions. To the latter, who is necessarily a student worker, whether empirical or scientific, the days are all too short. The night that interrupts his study jars harshly upon such an enthusiastic searcher. He sees in every appreciable molecular change, not alone the final result (a money representative), in the form of a materialistic tincture of lifeless extract or proximate principle, but an experience enjoyable not only because it is valuable to humanity and the profession by reason of an evolved product that follows the end reaction, but as affording enjoyment to the investigator because of a healthful stimulus which the mind appreciates from

the consideration of the recurring phenomena, many phases of which are beautiful to contemplate. To him (the thoughtful apothecary) a finished product is not a merchantable commodity alone, but a something instinct with its own peculiar property and forces, which give to it a historic individuality. The path leading up to the final result becomes often to the manipulator the more important, for it has marked a course of pleasurable and recreative study and observation.

If any reader of this paper does not experience in his experimental work the keen satisfaction that comes to one who realizes that his own intellectual powers are vibrating in harmony with the Infinite Mind, and that the materials changing as dissolving views before his eyes are not inanimate, but upon the contrary are living and moving substances, teeming with enigmatical suggestions of possibilities in science fields—such a person will doubtless be content with the fallacious belief that the art of pharmacy possesses no attraction outside of business rivalries, and no incentive beyond the dollar. To him, absorbed only in the trade and traffic side of his art, the usual dictionary definition of the term "Pharmacist" will be entirely satisfactory.

I am convinced, however, that many are not content with such an imperfect and thoughtless estimate of the ideals of our membership. The under-current of pharmacy, whether considered as a science in itself or as an art, demands more appreciative attention than has as a rule been given to it heretofore, even by some authors after whom we read.

As the study of energy in modern science has at last dominated that of matter, so in pharmacy, material products may yet become subservient to a study of the forces that produce them. In the study of such phenomena comes a gratification to one's self, a credit to pharmacy, and a service to humanity.

VISION.

We only do the things that we see done at the start.

There is a great deal of difference between a dreamer and a man who sees visions. The dreamer awakes to the fact that he was asleep all the time, and the dream is soon forgotten; but the man who sees visions sees while awake, the workings of his mind and heart constantly building, formulating—bringing the thing to pass.

The man with vision is the man of understanding. He knows how to correlate experience with accomplishment. He can readily designate the real from the unreal.

No man or woman ever achieved anything who did not have vision.

There is a kind of silent mastery about the mind that can see visions. Visions are usually born in darkness, however. They are great lights that a man's brain sees, like some great star at night-time, that fascinates the eye above the billions of other, smaller stars. Vision is an attribute of character. Little men never have it.

You need no eyes to have vision—for the power of mindsight seems to melt into something very wonderful when it is ready for vision.

But vision isn't mysterious. It's very simple. It's the big in you that you know you can be. And it's the great outside of you that you know is able to come to pass.—George Matthew Adams.

THE MANUFACTURE OF ACETPHENETIDIN.

BY WILLIAM A. KONANTZ.

(*Continued from p. 290, April issue.*)

PREPARATION OF INTERMEDIATES.

1. PREPARATION OF *p*-NITROPHENOL.

Para-nitrophenol is the initial intermediate in the processes of making acetphenetidin described by Hinsberg, Platt, Täuber and Paul. In the practical application of these processes the *p*-nitrophenol seems to have been always obtained from phenol by direct nitration, as no reference to any other source or method of preparation is to be found in the literature in connection with descriptions of these processes. Para-nitrophenol has, however, been made from phenol in several indirect ways, *viz.*, by the nitration and subsequent saponification of the esters of phenol with phosphoric acid,[1] benzene-sulphonic acid, toluene-sulphonic acid, etc.;[2] it has also been prepared from nitromalonaldehyde,[3] aniline, *p*-nitroacetanilid, and *p*-chlornitrobenzene. The indirect methods from phenol, and also the preparation from nitromalonaldehyde, need not be considered further, as they are obviously not economical for the technical preparation of large quantities of *p*-nitrophenol. Of the other methods, starting with phenol, aniline, *p*-nitroacetanilid, and *p*-chlornitrobenzene, a comparative study has been made as follows:

Preparation of p-Nitrophenol from Aniline.

HISTORICAL.

Deninger[4] was very successful in converting aniline into nitrophenol by the following method: 10 Gm. of aniline, 200 Cc. of concentrated sulphuric acid, and 800 Cc. of water were mixed and cooled below 15°. To this solution 300 Gm. of sodium nitrite, dissolved in 100 Cc. of water, were added, the first third slowly, with cooling, the remaining two-thirds rapidly, without cooling. The mixture was immediately heated on a boiling water-bath, and diluted sulphuric acid (50 Cc. of sulphuric acid and 50 Cc. of water) added as rapidly as the violent reaction permitted. When the reaction was complete the *o*-nitrophenol was distilled off with steam, and the *p*-nitrophenol obtained from the residue by crystallization from water or hydrochloric acid. The yield was reported as 4.7 Gm. of *o*-nitrophenol and 3.7 Gm. of *p*-nitrophenol, corresponding to 56 percent of the theoretical. The method is not suitable for technical use.

Nolting and Wild[5] converted aniline into nitrophenol according to the following method: 93 Gm. of aniline, 150–200 Gm. of concentrated sulphuric acid, and 2 l. of water were mixed and cooled to 0°. To this solution 69 Gm. of sodium nitrite were added, and somewhat later 119 Gm. of nitric acid of s. g. 1.335 (= 63 Gm. of HNO_3) were run in. The mixture was then heated under reflux until the evolution of nitrogen ceased. The *o*-nitrophenol was then distilled off with steam, and the *p*-nitrophenol crystallized from the residue. The yields were not given. It was stated that the two isomers were obtained in approximately equal amounts.

EXPERIMENTAL.

The work of Nolting and Wild was repeated in three experiments. The chief product of the reaction was found to be phenol. Only about 5 Gm. of *o*-nitrophenol

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[1] *Ann.*, 224, 156, 1884.

[2] *Gazz. chim. ital.*, 11, 76, 1881; *Société des Usines der Rhône, D. R. P.* No. 91,314; *Frdl.* IV, 39; Brit. Pat. No. 24,193, 1895; *J. Soc. Chem. Ind.*, 1897, 40.

[3] *Ber.*, 28, 2598, 1895.

[4] *J. prakt. Chem.*, [2] 40, 298.

[5] *Ibid.*, [2] 17, 189.

and 4.5 Gm. of *p*-nitrophenol were obtained from 93 Gm. of aniline. Considerable tar was formed in each case. It is probable that phenol is first formed from the diazo compound, and this is then nitrated. As the solution contains but one mol of nitric acid in a strength of 2–3 percent it is evident that effective nitration can not take place.

Preparation of p-Nitrophenol from p-Nitroacetanilid.

HISTORICAL.

In 1874 Paul Wagner[6] studied the effect of concentrated solutions of sodium hydroxide on *p*-nitroacetanilid in order to determine whether *p*-nitrophenol is formed. Wagner found his conjecture confirmed, and stated that "the change of the nitroacetanilid into nitrophenol is a complete one, provided the heating is continued sufficiently long." With regard to his method, Wagner says, "I heat the nitroacetanilid with a concentrated solution of caustic soda, when an abundant evolution of ammonia immediately results. I continue to heat until the evolution of ammonia ceases. On cooling, needle-like crystals separate, which it is not difficult to recognize as the sodium salt of nitrophenol. These are dried, and decomposed by means of boiling hydrochloric acid; from the strongly acid liquid, light yellow needles crystallize on cooling, which by repeated crystallization from very dilute alcohol are obtained pure. The melting point of the crystals lies at 114° C." Since *p*-nitroacetanilid can be obtained in yields of 95 percent[7] by the nitration of acetanilid, this method seemed promising, and the work of Wagner was repeated, but the results were less satisfactory than he reported.

EXPERIMENTAL.

10 Gm. of *p*-nitroacetanilid were heated with varying amounts of sodium or potassium hydroxide and water, in a vessel provided with a reflux-condenser and surrounded by a paraffin-bath heated to 150°. The heating was continued until moist litmus-paper held at the upper end of the condenser-tube no longer turned blue; this required 20–24 hours. Water was then added, and the mixture made acid with hydrochloric. After boiling for 10 minutes with a small amount of animal charcoal, the mixture was filtered and the filtrate allowed to crystallize. Additional portions of crystals were obtained by evaporating the mother-liquor until the inorganic salt began to appear. Ten experiments were made as follows:

p-Nitroacetanilid. Gm.	Sodium hydroxide. Gm.	Water. Gm.	*p*-Nitrophenol. Gm.	Yield. Percent.
10	10	10	3.8	50
10	15	15	4.5	59
10	20	20	3.8	50
10	20	35	3.6	47
10	15	200	(*p*-nitraniline)	0
p-Nitroacetanilid. Gm.	Potassium hydroxide. Gm.	Water. Gm.	*p*-Nitrophenol. Gm.	Yield. Percent.
10	10	10	3.5	45
10	10	25	4.6	60
10	15	15	4.5	58
10	20	20	3.4	44
10	20	35	4.0	54

The average yield is 52 percent.

An experiment was also carried out in which 10 Gm. of *p*-nitroacetanilid were heated under the same conditions with 20 Gm. of exsiccated sodium carbonate

[6] *Ber.*, 7, 77, 1874.

[7] *Ibid.*, 17, 262, 1884.

and 25 Gm. of water. The *p*-nitroacetanilid was recovered unchanged. Calcium hydroxide likewise had no effect.

Two experiments were run in which the alkali was replaced by strong mineral acid, thinking that this might effect a similar hydrolysis of the *p*-nitroacetanilid. In the one experiment 10 Gm. of *p*-nitroacetanilid were heated under pressure for 12 hours with 50 Cc. of 50 percent sulphuric acid, and in the other experiment 50 Cc. of concentrated hydrochloric acid were used. In both cases the product was the corresponding salt of *p*-nitraniline.

Preparation of p-Nitrophenol from Phenol.

HISTORICAL.

The nitration of phenol appears to have been first studied by Hoffmann,[8] in 1857. He reported two methods for the preparation of the mono-nitrophenols; first, by mixing small portions of phenol and concentrated nitric acid, both cooled in a freezing-mixture, and then pouring the mixture into water and distilling with steam; and second, by dissolving the phenol in a large amount of water, adding concentrated nitric acid and distilling with steam. The first method did not always prove successful on account of the violent reaction which occurs when the two substances are mixed in concentrated form. Hoffmann states, however, that it gave better yields when it was successfully carried out. The actual yields were not given.

Fritzsche,[9] in 1859, described very fully the preparation and separation of the mono-nitrophenols, but, like Hoffmann, he failed to report the yields which he obtained. His method was to dissolve 25 Gm. of phenol in 1250 Gm. of water, heat the solution to boiling, and add slowly, with stirring, 37.5 Gm. of nitric acid. The *o*-nitrophenol was distilled off with steam, and the *p*-nitrophenol crystallized from the residue.

The yields obtained by the nitration of phenol were first mentioned by Cook and Schmitt.[10] These investigators stated that by adding one part of crystallized phenol to two parts of nitric acid of s. g. 1.34 and four parts of water, 30 percent of the phenol is obtained as *o*-nitrophenol and 32 percent as *p*-nitrophenol. This is the method described by Platt (see page 288) in connection with the manufacture of acetphenetidin, and is also the method given in many text-books on industrial chemistry.[11]

In 1875 Weselsky[12] reported that when nitrogen trioxide, obtained from nitric acid and starch, is passed into an ethereal solution of phenol (200 Gm. in 1 l.) phenol-diazo-nitrate is precipitated, and the mother-liquor contains much ortho- and para-nitrophenol. However, he did not state in what quantities he obtained these mono-nitrophenols.

In 1880 Natanson[13] treated phenol with ethyl nitrate and sulphuric acid and obtained an oil which was purified by converting it into the sodium compound and then decomposing it with hydrochloric acid. He states that 22 percent of ortho- and 0.5 percent of para-nitrophenol were obtained.

Schall,[14] in 1883, suspended sodium phenolate in carbon disulphide and added, with cooling, liquid nitrogen tetroxide. After standing for some time the mixture was filtered, the carbon disulphide distilled off, and the residue treated with steam. The *o*-nitrophenol passed over with the steam, and the *p*-nitrophenol was extracted from the residue with ether. The yields were not stated. The author claimed that the *p*-nitrophenol was obtained in greater purity than by the usual methods of nitration.

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[8] *Ann.*, 103, 347, 1057.

[9] *Ibid.*, 110, 150, 1859.

[10] *Lehrb.* (Kekulé), III, 40.

[11] "Dyestuffs and Coal-Tar Products," Beacall, Challenger, Martin and Sand, Appleton and Co., 1915.

[12] *Ber.*, 8, 98, 1875.

[13] *Ibid.*, 13, 416, 1880.

[14] *Ibid.*, 16, 1901, 1883.

In 1885 Neumann[15] found that adding the diluted nitric acid to the phenol increases the proportion of *o*-nitrophenol. His method was to add gradually to one part of phenol a mixture of one part of nitric acid of s. g. 1.38 and six parts of water cooled to 0°. The brown oil which formed was subjected to steam distillation in a copper still. The wash-water was also distilled with steam after neutralization with sodium bicarbonate. The proportion of ortho- to para-nitrophenol was not stated.

Goldstein[16] observed that the higher the temperature reached by the mixture of nitric acid and phenol the greater is the proportion of ortho-nitrophenol formed, low temperatures seeming to favor the formation of the para-compound.

In 1905 Martinsen[17] made a very thorough study of the reaction-kinetics of the nitration of phenol in aqueous solution. The work was divided into eight parts: preparation of the mono-nitrophenols, measurement of the reaction velocity, influence of the concentration of the nitric acid and the phenol, influence of the degree of dissociation of the nitric acid, influence of nitrous acid, determination of the mode of action of nitrous acid, relation between the nitration velocity and the formation of nitrous acid, and the influence of nitrosophenol. The work was carried out with solutions of phenol 0.05–0.2 *N* and of nitric acid 0.6–0.8 *N*. The results were expressed in terms of 0.1 *N* sodium hydroxide. Lacmoid was used as the indicator, but the color change was not distinct as the nitrophenols themselves give color changes. Martinsen's conclusions were as follows: The nitration of phenol in aqueous solution is a very complicated autocatalyzed reaction, the velocity increasing with increasing concentration of the acid and decreasing with increasing concentration of the phenol. The velocity is increased by substances which have an ion in common with the nitric acid, potassium nitrate and sulphuric acid acting in harmony and a little stronger than sodium nitrate and strontium nitrate, which also act in harmony. Nitrous acid is a strong positive catalyst. During the nitration nitrous acid is formed, which explains the autocatalysis. The velocity of nitration and the speed with which the nitrous acid is formed run parallel. If the formation of nitrous acid is hindered (with urea) the nitration is hindered, but least with low concentrations of the nitric acid. Nitrosophenol increases the velocity of nitration, but the influence is not dependent on the concentration.

In 1906 Francis[18] nitrated phenol in carbon tetrachloride with benzoyl nitrate, and found that a mixture of ortho- and para-nitrophenols is formed, the ortho-compound predominating.

In 1907 Pictet[19] nitrated phenol with acetyl nitrate, prepared from acetic acid and nitrogen pentoxide, and obtained a mixture of ortho- and para-nitrophenol in the proportion of 52 percent ortho and 48 percent para. The exact yields were not given.

In 1910 Hart[20] reported that the production of tar is completely avoided and a yield of 18 percent of *p*-nitrophenol (13 Gm. from 50 Gm. of phenol) is uniformly obtainable if the nitric acid is vigorously stirred during the time that the phenol is being added and for about one-half hour afterward. About 30 Gm. of ortho-nitrophenol were said to be obtained at the same time. The temperature was found to have little influence on the yields of either isomer; the best yield, however, was obtained at 25°; below 4° nitration could not be effected.

In 1911 Pictet[21] reported his experiments on the nitration of phenol at low temperatures. In two experiments, carried out respectively at 0° and at —20–30° about 6 Gm. of *p*-nitrophenol were obtained from 80 Gm. of phenol. At —50–60° no reaction occurred until an electric current was passed through the mixture when the reaction proceeded without increase of temperature and a yield of 15 Gm. of *p*-nitrophenol from 40 Gm. of phenol was obtained, practically five times as much as at normal temperatures.

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[15] *Ber.*, 18, 3320, 1885.
[16] *J. russ. phys. chem. Ges.*, 10, 353; Beilstein, II, 681.
[17] *Z. physik. Chem.*, 50, 385, 1905.
[18] *Ber.*, 39, 3801, 1906.
[19] *Ibid.*, 40, 1165, 1907.
[20] *J. Am. Chem. Soc.*, 32, 1105, 1910.
[21] *J. Roy. Soc. Arts*, 56, 678–702, 1911: *J. Soc. Chem. Ind.*, 1911, 683.

EXPERIMENTAL.

Preparation of ortho- and para-nitrophenol by the method of Cook and Schmitt.—50 Gm. of crystallized phenol were added slowly, with vigorous stirring, to a mixture of 100 Gm. of nitric acid (s. g. 1.34) and 200 Gm. of water, the temperature being kept at about 20°. The mixture was stirred for one-half hour after the addition of the phenol was completed, and then allowed to stand one and one-half hours longer. Five hundred Cc. of water were then added, and the heavy oil separated, washed with water, and subjected to steam distillation. By this operation the *o*-nitrophenol distilled over. The residue was boiled with 20 Gm. of animal charcoal, filtered hot, and allowed to crystallize in the cold. The *p*-nitrophenol crystallized in long needles, mixed with some tar. The mother-liquor was evaporated until no more crystals were obtained. The *p*-nitrophenol was purified by recrystallization from water with the aid of a little hydrochloric acid and animal charcoal. The average yield of several experiments was 20 Gm. of *o*-nitrophenol and 12.5 Gm. of *p*-nitrophenol, corresponding to about 44 percent of the theoretical yield.

Preparation of ortho- and para-nitrophenol by the method of Hart.—50 Gm. of crystallized phenol, liquefied by the addition of 5 Gm. of alcohol, were added slowly, with vigorous stirring, to a solution of 80 Gm. of sodium nitrate and 100 Gm. of concentrated sulphuric acid in 200 Cc. of water, the temperature being kept at about 20°. The stirring was continued for one-half hour after the addition of the phenol was completed, the mixture was allowed to stand for an hour and one-half longer, and then treated with 500 Cc. of water. The separation of the products was effected as in the experiments above-described. The yield did not differ materially from those obtained by the method of Cook and Schmitt. The author was unable to obtain 30 Gm. of *o*-nitrophenol as reported by Hart. The formation of tar is not avoided by this method, and the *p*-nitrophenol could not be obtained pure without recrystallization as Hart claimed.

Treatment of the Spent-Acid and Wash Water.—The spent-acid and wash-water from the experiments above-described were treated with a concentrated solution of sodium carbonate until Congo Red paper was no longer turned blue, showing the absence of mineral acid. The solutions were then subjected to steam distillation and the residues evaporated to crystallization. 3–4 Gm. of *o*-nitrophenol and 4–5 Gm. of *p*-nitrophenol were obtained from the spent-liquors of each experiment. It is evident that a considerable loss of the nitrophenols is sustained by discarding these liquors as directed in the original methods. By neutralization in this way the yields may be increased to 56 percent.

Effect of the Mass and Concentration of the Nitric Acid.—In the experiments tabulated the following procedure was adopted:

50 Gm. of crystallized phenol, liquefied by warming with 5 Cc. of water, were added slowly, with vigorous stirring, to the acid solution, the temperature being kept at about 20°. The mixture was stirred for one-half hour after the addition of the phenol was completed, allowed to stand for four hours longer, and then treated with 500 Cc. of water. Sodium carbonate was then added until Congo Red paper was no longer turned blue. The *o*-nitrophenol was separated by steam distillation, and the residue boiled for thirty minutes with 20 Gm. of animal charcoal, filtered hot, and allowed to crystallize. Additional portions of *p*-nitrophenol were obtained by evaporating the mother-liquor until the inorganic salt began to appear. The *p*-nitrophenol was recrystallized from water with the aid of hydrochloric acid and animal charcoal.

Phenol. Gm.	Absolute nitric acid. Gm.	Molecular Ratio.	Water. Gm.	Strength of acid. Percent.	o-Nitro-phenol. Gm.	p-Nitro-phenol. Gm.
50	33.5	1:1	250	11.81	5.8	0.6
50	67.0	1:2	250	21.13	23.2	16.9
50	100.5	1:3	250	28.67	26.2	18.9
50	134.0	1:4	250	34.89	26.8	19.1
50	167.5	1:5	250	40.11	25.3	13.4
50	67.0	1:2	125	34.89	26.7	19.7
50	50.0	1:1.5	125	28.67	26.8	18.1
50	67.0	1:2	500	11.81	17.3	7.4
50	50.0	1:1.5	95	34.89	23.9	20.8
50	50.0	1:1.5	40	55.00	25.5	15.3
50	40.0	1:1.2	80	34.89	23.1	17.0

From these experiments it appears that the best results are obtained when nitric acid of about 35 per cent is used, although there is no great difference in yield between 28 and 35 percent. The acid used by Cook and Schmitt and by Hart is about 20 percent. Nitric acid of about 30 percent has a maximum specific conductivity, and it is possible that some relation exists between this property and the nitrating power of the acid. In Martinsen's experiments the non-dissociated part of the acid seemed to be the more active in effecting nitration.

For the preparation of the mono-nitrophenols the proportions given in the sixth experiment are the most suitable, these being practically one part of phenol to four parts of nitric acid (s. g. 1.21, 25° Bé.). About 65 Gm. of crystallized sodium carbonate are required for the neutralization of the acid liquid. By using these proportions and the process oultined above, yields of about 63 percent of the theoretical can be obtained.

Effect of Nitrous Acid.—Martinsen found nitrous acid to be a strong positive catalyst. In the following experiments sodium nitrate was added to the acid solution, a sufficient excess of nitric acid being used to decompose the sodium nitrite and liberate the nitrous acid.

Phenol Gm.	Absolute nitric acid. Gm.	Molecular ratio.	Water. Gm.	Strength of acid. Per cent.	Sodium nitrite. Gm.	o-Nitro-phenol. Gm.	p-Nitro-phenol. Gm.
50	51	1:1.5	94	34.89	2	25.8	19.3
50	53	1:1.5	94	34.89	7	21.2	21.1
50	68	1:2	250	21.13	2	26.0	19.0

The yield of the nitrophenols does not seem to be greatly affected by the addition of sodium nitrite. In these experiments it was observed that the nitrophenols did not separate in the form of an oil as usual, but as a mass of yellowish white needles, until about two-thirds of the phenol had been added. An experiment was run identical with the first above-described except that the addition of phenol was stopped when two-thirds, or 33 Gm., had been added. The yields, calculated to 50 Gm. of phenol, were 25.4 Gm. of ortho and 21 Gm. of para. Evidently the formation of the oil is not detrimental.

Effect of Urea.—Martinsen found that when the formation of nitrous acid is prevented the nitration of phenol is hindered. A solution containing 67 Gm. of absolute nitric acid in 245 Cc. of water was boiled for one hour under a reflux with 5 Gm. of urea in order to destroy the nitrous acid. Fifty Gm. of phenol, liquefied with 5 Cc. of water, were then added as before. About 18 Gm. of

ortho- and 7 Gm. of para-nitrophenol were obtained. Considerable tar was formed.

Effect of Copper.—When copper reacts with nitric acid, nitrous acid is produced. As nitrous acid was said to be catalytic it was thought that the addition of copper might improve the yields. Acid of 55 percent was usually used as this nitric acid gives the largest amount of nitrous acid with copper. The copper was obtained by adding zinc dust to a solution of copper sulphate.

Phenol Gm.	Absolute nitric acid. Gm.	Molecular ratio.	Water Gm.	Strength of acid. Percent.	Copper Gm.	*o*-nitrophenol. Gm.	*p*-nitrophenol. Gm.
50	51.5	1:1.5	95	34.89	1	25.0	15.0
50	51.5	1:1.5	65	55.00	1	27.5	20.2
50	53.0	1:1.5	65	55.00	2	26.9	19.8

Effect of Sulphuric Acid.—A number of experiments were run in which sulphuric acid was added to the solution of nitric acid. Some dinitrophenol was invariably formed with a corresponding decrease in the yield of mono-nitrophenols.

Determination of the Velocity of Reaction.—In order to determine how long it was necessary to allow the nitration mixture to stand before separating the nitrophenols, experiments were run in which 5 Cc. of the acid solution were removed every hour and titrated with a solution of sodium hydroxide. Congo Red was found to be the best indicator for this purpose, and if the acid portion is diluted with 50 Cc. of water the color-change is fairly distinct. The following is typical of the results obtained, and shows that the reaction is complete in about four hours after the addition of the phenol.

Time in hours.	Cc. of alkali required.	Note.
0	28.8	Before phenol was added
1	15.1	All phenol just added
2	13.6	
3	13.1	
4	12.9	
5	12.8	
6	12.8	

Purification of p-Nitrophenol.—The *p*-nitrophenol obtained by the nitration of phenol is invariably accompanied by considerable tar which it is quite difficult to separate. For purifying the *p*-nitrophenol boiling with hydrochloric acid and precipitation of this with concentrated sodium hydroxide solution, conversion into the calcium and then into the sodium salt, and crystallization from naphtha, acetone and chloroform-ligroin have been recommended. The author obtained the best results by crystallizing from water with the aid of hydrochloric acid and animal charcoal. Solutions of *p*-nitrophenol in water are yellow but the addition of a slight amount of acid decolorizes them. Very large crystals may be obtained by crystallizing from benzene. The solubility of *p*-nitrophenol in benzene at 25° and at the boiling-point of the benzene was determined, and found to be as follows: at 25° one gramme of benzene dissolves about 0.02 Gm. of *p*-nitrophenol and at the boiling-point of benzene about 0.6 Gm. of *p*-nitrophenol. Para-nitrophenol is therefore about 30 times as soluble at the boiling-point as at 25°.

Preparation of p-Nitrophenol from p-Chlornitrobenzene.

HISTORICAL.

In 1862 Riche[22] reported that mono-chlorbenzene is easily converted into chlornitrobenzene by means of concentrated nitric acid.

In 1866 Sokoloff[23] made a study of the chlornitrobenzenes. He stated that by the action of nitric acid on chlorbenzene two nitro-compounds are produced, the one a solid, the other a liquid, at ordinary temperatures. To obtain the mono-chlornitrobenzenes he heated chlorbenzene with nitric acid (s. g. 1.49), and poured the resulting mixture into cold water. Sokoloff states that by this treatment chlorbenzene made from benzene gave a crystalline mass, but chlorbenzene made from phenol gave a fluid product. Both products, however, were mixtures of two isomers, which he separated by crystallization and fractionation. In the case of chlorbenzene made from benzene the relative proportion of the liquid isomer to the solid isomer was 5:1; in the case of chlorbenzene made from phenol the proportion was 2:1. When nitric acid of a lower specific gravity than 1.49 was used the proportion of the solid to the liquid isomer was increased; in all cases, however, two isomers were formed. Sokoloff reports that he tried the action of alcoholic potassium hydroxide on the chlornitrobenzenes. In one part of his paper he states that a strongly alcoholic solution of potassium hydroxide acts very weakly on the chlornitrobenzenes; by long heating the solution is colored brown, but on cooling the greater part of the chlornitrobenzenes separates unchanged. In another part of his paper he states that alcoholic potash solution works energetically on these nitro-compounds, probably producing the corresponding azo-compounds.

In 1870 Engelhardt and Latschinow[24] reported that by heating the chlornitrobenzenes with a solution of sodium hydroxide three days at 130° the chlorine atom is replaced by the hydroxyl group, the solid chlornitrobenzene giving *p*-nitrophenol, the liquid chlornitrobenzene giving the volatile, or ortho-nitrophenol.

In 1900 Holleman and de Bruyn[25] made a study of the relative proportion in which the two chlornitrobenzenes are formed; they used the freezing-point method. At first they added 25 Gm. of chlorbenzene to 50 Cc. of nitric acid (s. g. 1.52) at 0°. The product was partially fluid at —5°, while the eutectic of the system ortho- + para-chlornitrobenzene is 14.7°. A study of the specific gravity and boiling-point of the mixture led them to believe that the mixture contained chlordinitrobenzene. In subsequent experiments a more dilute acid was used. 25 Gm. of chlorbenzene were added to a mixture of 50 Cc. of nitric acid (s. g. 1.48) and 10 Cc. of nitric acid (s. g. 1.52) at 0°. This product gave only a trace of oil at 15°. The freezing-point of the mixture was 58.9°, corresponding to 30.1 percent of ortho- and 69.9 percent of para-chlornitrobenzene. An experiment carried out at —30°, with a mixture of 40 Cc. of nitric acid (s. g. 1.48) and 10 Cc. of nitric acid (s. g. 1.52) gave a product with a freezing-point of 61.75°, corresponding to 26.9 percent of ortho- and 73.1 percent of para-chlornitrobenzene. They concluded that the temperature has only a slight effect on the relative proportion of the two isomers.

In 1917 Ellis, Rabinovitz and Wells[26] stated that "mono-nitrochlorbenzol is readily obtained by the action of a mixture of commercial sulphuric acid (66° Bé.) and nitric acid (39° Bé.) on mono-chlorbenzol." They described their method as follows:

"One part (by weight) of chlorbenzol was gradually added to three parts (by weight) of a mixture of equal parts (by volume) of sulphuric acid (s. g. 1.8) and nitric acid (s. g. 1.43). In order to check the violence of the reaction it was necessary to cool the reaction vessel by immersing it in cold water during the introduction of the chlorbenzol into the acid mixture. The oil was then separated from the spent acid, washed and dried. A yield of about 95 percent of the theoretical was obtained. By several crystallizations from alcohol it was found that the mixture was made up of about 48 percent of the para-compound, melting at 81° (melting point given in the literature is 83° C.) and 52 percent of the ortho-derivative, which melted at 28° C."

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[22] *Ann.*, 121, 357, 1862.

[23] *Bull. acad. St. Pétersb.*, 380; *Z. Chem.*, 1866, **621**; *Chem. Zentr.*, 1866, 1089.

[24] *Z. Chem.*, VI, 2, 225.

[25] *Rec. trav. chim.*, 1900, 189.

[26] *Chem. Eng.*, 1917, XXV, 1, 22.

For the conversion of the chlornitrobenzenes into the corresponding nitrophenols these authors give the following directions:

"One part of the mixed nitrochlorbenzols was heated in an autoclave for 4 hours at 60 pounds' pressure, with one part of sodium hydroxide and 20 parts of water. The conversion of the nitrochlorbenzols into the sodium salts of the nitrophenols was practically quantitative. The amount of tar formed was slight, and the sodium salts crystallized out as well defined needles. The use of more concentrated solutions of sodium hydroxide in the hydrolysis is not advantageous, as they tend to form considerable amounts of tarry bodies.

"Milk of lime was used in several experiments in place of sodium hydroxide solution, but without success, the nitrochlorbenzols being recovered practically unchanged.

"Mono-nitrochlorbenzol was boiled at atmospheric pressure with a concentrated solution of sodium hydroxide. With the exception of a slight amount of resin formation, the action of the alkali was negligible."

"The liquid from the autoclave was filtered, acidified cautiously with dilute acid, cooled and treated with sodium chloride to saturation to separate the nitrophenols."

EXPERIMENTAL.

The following procedure was found most convenient for the laboratory separation of the nitrophenols from chlorbenzene, and was used in the experiments reported below:

A mixture of 132 Gm. of nitric acid, s. g. 1.42, and 168 Gm. of sulphuric acid, s. g. 1.84, is energetically stirred by means of a mechanical stirrer, and kept at about 20° by a stream of cold water surrounding the vessel. To this 100 Gm. of chlorbenzene are added, drop by drop, from a separatory funnel. The stirring is continued for several hours after the addition of the chlorbenzene is completed. The mixture is then poured upon 375 Gm. of crushed ice, and the nitrating-vessel washed out with 125 Cc. of ice-water, which are added to the ice-mixture. The temperature will fall to about —5°. When most of the ice has melted, the crystalline mass is broken up with a glass rod, filtered quickly at the pump, and washed with four portions of 50 Cc. each of ice-water. The chlornitrobenzenes, still wet, are then transferred to an autoclave containing 140 Gm. of sodium hydroxide dissolved in 2800 Cc. of water. The mixture is heated for four hours at 60 pounds' pressure. While still hot the solution of the sodium salts of the nitrophenols is transferred to an apparatus equipped for steam distillation, the mixture made acid to Congo Red test-paper with concentrated hydrochloric or sulphuric acid, and the *o*-nitrophenol then separated by passing a current of steam through the mixture. The residue is then filtered hot and allowed to crystallize in the cold. By evaporating the mother-liquor additional portions of crystals are obtained until the inorganic salt begins to appear.

The following results were obtained in three experiments:

o-Nitrophenol. Gm.	*p*-Nitrophenol Gm.	Yield. Percent.
25.3	78.7	84.2
26.8	77.0	84.0
27.0	77.0	85.0

In order to determine whether the temperature has any effect on the relative proportion or yields of the isomers, two experiments were run, the first with the temperature of nitration at 50°, the second with the temperature at 5°, with the following results:

Temperature.	*o*-Nitrophenol. Gm.	*p*-Nitrophenol. Gm.	Yield. Per cent.
50	25.6	78.0	83.8
5	27.0	72.4	80.4

In the experiment carried out at the higher temperature about 0.3 Gm. of dinitrophenol was obtained. In the experiment at the lower temperature, it seems that the nitration was incomplete.

The quantity of alkali used in the preceding experiments is approximately that used by Ellis, Rabinovitz and Wells, and is about twice the quantity required by theory. The following experiments were run in which the amount of sodium hydroxide was reduced to about 1.15–1.25 times that required by theory.

Sodium hydroxide. Gm.	Water. Gm.	Pressure. Lb.	Hours.	*o*-Nitrophenol. Gm.	*p*-Nitrophenol. Gm.	Yield Per cent.
80	1600	60	4	22.8	63.0	69.4
80	1600	60	8	28.0	73.4	82.1
80	1600	80	8	30.8	81.2	90.7
80	1600	80	8	31.5	81.0	91.1
90	1800	80	8	31.2	84.0	93.2

From these experiments it appears that better results are obtained with 80–90 Gm. of sodium hydroxide at 80 lb. pressure for eight hours than with 140 Gm. of sodium hydroxide at a lower pressure and a shorter heating. The nitrophenols obtained in this way were very pure, and no tar whatever was formed during the reaction.

In the last experiment above-described 73 percent of the total yield is *p*-nitrophenol and 27 percent *o*-nitrophenol. These figures must also represent approximately the relative proportions of the two chlornitrobenzenes in the mixture from which the nitrophenols were made. The figures are practically identical with those obtained by Holleman and de Bruyn for the chlornitrobenzenes by means of the freezing-point method, *i. e.*, 73.1 percent and 26.9 percent. Ellis, Rabinovitz and Wells, who determined the relative proportion of the two isomers by means of fractional crystallization from alcohol, found the mixture to consist of 48 percent of the para- compound and 52 percent of the ortho-derivative. These investigators are undoubtedly in error.

CONCLUSION.

Para-nitrophenol is apparently most economically prepared by heating *p*-chlornitrobenzene under increased pressure with an aqueous solution of sodium hydroxide.

2. PREPARATION OF *p*-NITROPHENETOL.

The next intermediate to *p*-nitrophenol in the processes of making acetphenetidin described by Hinsberg, Platt and Paul is *p*-nitrophenetol, $C_2H_5.C_6H_4.NO_2$.

HISTORICAL.

Para-nitrophenetol was probably first made by Cahours[27] in 1849 by the action of fuming nitric acid on phenetol. He obtained a solid and a liquid; the former he called dinitrophenetol and the latter mono-nitrophenetol.

The discovery of *p*-nitrophenetol is, however, usually credited to Fritzsche,[28] who prepared it in 1859 by the action of ethyl iodide on the silver salt of *p*-nitrophenol. The *p*-nitrophenetol was extracted and purified by treating the mixture with ether, evaporating the solvent, and distilling the remaining reddish yellow liquid. The product thus obtained was a colorless crystalline solid melting at 57–58°.

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[27] *Ann. chim. phys.*, [3] 27, 465, 1849.

[28] *Bull. classe phys.-math.*, 17, 145, 1859; *J. prakt. Chem.*, 175, 257; *Ann.*, 110, 155; *Jsb. Chem.*, 11, 407.

In 1879 Hallock[29] repeated the experiments of Cahours with somewhat different results. The dark red, viscous liquid which Hallock obtained by the action of fuming nitric acid on pure phenetol, or on a solution of phenetol in acetic acid, was distilled in a current of steam. The product consisted of a solid and a liquid in varying proportions according to the conditions of nitration. The solid when purified by repeated crystallization both from acid and from alcohol, was proved by an ultimate analysis to be a mono-nitrophenetol. Its melting point and other physical properties corresponded to those of *p*-nitrophenetol prepared by Fritzsche as above-described. Hallock also obtained the same body by the action of potassium ethyl sulphate and potassium hydroxide on *p*-nitrophenol in closed tubes at high temperatures. In this operation, however, a considerable quantity of the nitrophenol remained unchanged. Ethyl iodide and potassium hydroxide heated in a sealed tube with *p*-nitrophenol also yielded the same body, but quite impure. The method of direct nitration, Hallock states, yields the purest product but is quite tedious. When the nitration was performed with nitric acid from which the red fumes had been removed by previous boiling, or by means of hot concentrated acid, the product was mostly liquid and refused to crystallize, even at low temperatures. This liquid Hallock regarded as a mixture of *o*-nitrophenetol and unchanged phenetol, holding some *p*-nitrophenetol in solution. Hallock[30] found that these different methods gave very poor yields of the ether.

In 1881 Willgerodt[31] found that when *p*-chlornitrobenzene is heated with an alcoholic solution of potassium hydroxide in a closed vessel at 100–130° *p*-nitrophenetol is one of the products; the yield, however, was very small, and the method unsuitable for the preparation of large quantities. In 1882 Willgerodt[32] reported that a larger yield of the ether could be obtained if the alcohol were properly mixed with water, and the mixture refluxed for a long time (36 hours). The product, however, was a mixture of unchanged *p*-chlornitrobenzene, dichlorazoxybenzene, *p*-nitrophenol, and *p*-nitrophenetol, the separation of which was rather tedious.

In 1883 Kolbe and Kauder[33] attempted to prepare *p*-nitrophenetol by the action of potassium ethyl sulphate on the sodium salt of *p*-nitrophenol. A concentrated aqueous solution of equimolecular quantities of the two compounds was refluxed in an oil-bath at 160–170° and then distilled. Very little *p*-nitrophenetol was obtained. The addition of an excess of sodium hydroxide did not improve the yield. Attempts to carry out the experiments under increased pressure were unsuccessful as the sealed tubes exploded before the temperature of 150° was reached.

In 1886 Willgerodt and Ferko,[34] believing that Kolbe and Kauder's poor results were due to the presence of water, substituted alcohol as the solvent. They heated the sodium salt of *p*-nitrophenol with an excess of alkali ethyl sulphate and alcohol in a closed tube for three hours. At 150° only traces of *p*-nitrophenetol were formed, but at 200° they state that the sodium salt of *p*-nitrophenol was completely converted into the ether. Higher temperatures, they found, produced charring.

In 1886 Hinsberg discovered the medicinal action of acetphenetidin, and the method which he adopted in his process of manufacture for the preparation of the *p*-nitrophenetol was as follows:[35] 50 Kg. of the potassium salt of *p*-nitrophenol were mixed with 300 Kg. of alcohol and 40 Kg. of ethyl bromide. The mixture was heated in an autoclave at a pressure of 3–4 atmospheres for about 8 hours. In order to separate the *p*-nitrophenol which had not taken any part in the reaction from the ether formed, the solution was treated with steam. This caused the ether to distill over, leaving behind the unchanged *p*-nitrophenol.

In 1896 Paul,[36] describing the manufacture of acetphenetidin, stated that the *p*-nitrophenetol was made as follows: 480 Gm. of the pure sodium salt of *p*-nitrophenol, 3120 Gm. of denatured alcohol, 300 Gm. of ethyl bromide (crude) and 100 Gm. of sodium carbonate, were

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[29] *Am. Chem. J.*, 1, 271, 1879.
[30] *Ber.*, 14, 37, 1881.
[31] *Ibid.*, 14, 2636, 1881.
[32] *Ibid.*, 15, 1002, 1882.
[33] *J. prakt. Chem.*, 28, 62, 1883; *Chem. Zentr.*, 1883, 521.
[34] *Ibid.*, 33, 152; *Chem. Zentr.*, 1886, 323.
[35] U. S. Pat. No. 400,086, Mar. 26, 1889.
[36] *Z. angew. Chem.*, 1896, 587.

heated under a reflux condenser for about ten hours. The contents of the vessel were then cooled, the solid *p*-nitrophenetol filtered off, and, in order to separate any unchanged *p*-nitrophenol it was washed with water until the washings were only faintly colored yellow. For complete purification the crude *p*-nitrophenetol was recrystallized from about three parts of alcohol.

In 1898[37] there was described a method of making *p*-nitrophenetol by treating the ester of *p*-nitrophenol and nitro-*p*-toluene-sulphonic acid with an alcoholic solution of sodium ethylate or with an alcoholic solution of sodium hydroxide when the following reaction was said to take place:

$$CH_3.C_6H_3.NO_2.SO_2.O.C_6H_4.NO_2 + NaOC_2H_5 = C_2H_5.OC_6H_4.NO_2 + CH_3.C_6H_4.NO_2.SO_2.ONa.$$

EXPERIMENTAL.

PREPARATION OF *p*-NITROPHENETOL FROM *p*-NITROACETANILID.

Para-nitroacetanilid when heated with concentrated aqueous solutions of sodium or potassium hydroxide is partially converted into *p*-nitrophenol, as has been stated. It was interesting to determine whether *p*-nitrophenetol would be produced if an alcoholic solution of the alkali were substituted for the aqueous solution. The reaction would then proceed thus: $NO_2.C_6H_4.NH.OC.CH_3 + C_2H_5OH + NaOH = NO_2.C_6H_4.OC_2H_5 + NH_3 + CH_3.COONa$. An experiment carried out by heating under a reflux for 24 hours a mixture of 18 Gm. of *p*-nitroacetanilid, 7 Gm. of potassium hydroxide, and 50 Gm. of absolute alcohol (commercial), gave *p*-nitraniline only. No ammonia was evolved. Sodium hydroxide gave the same results, and so did 90 percent alcohol.

PREPARATION OF *p*-NITROPHENETOL FROM *p*-NITROPHENOL.

Ethylation according to the method of Claisen and Eisleb.—Claisen and Eisleb[38] stated that alkylation could be easily and conveniently effected by heating together the substance to be alkylated, the proper alkyl halide, and potassium carbonate in acetone as the solvent. They worked with the allyl ethers only, but stated that other phenol-alkyl ethers could undoubtedly be made by the same method. In the case of the allyl ether of *p*-nitrophenol, these writers claim to have obtained a theoretical yield. The method was tried for the preparation of the ethyl ether of *p*-nitrophenol with the following results. 42 Gm. of *p*-nitrophenol and 45 Gm. of potassium carbonate, both dry and finely powdered, were refluxed with 36 Gm. of ethyl bromide and 100 Gm. of acetone for 8 hours. The acetone was then distilled off and the residue treated with steam. The *p*-nitrophenetol obtained from the steam-distillate amounted to 23.1 Gm. in one case and 23.4 Gm. in another, equivalent to 45.5 and 46.1 percent of the theoretical.

Since copper sometimes acts as a positive catalyst in the formation of ethers,[39] two experiments were run, identical with those above-described except that 0.5 Gm. of copper in one case, and 3 Gm. of copper in another, were added to the mixture. The copper was obtained by adding zinc dust to a solution of copper sulphate. The yield of ether was respectively 20.4 Gm. and 19.8 Gm., equivalent to 40.2 percent and 39 percent of the theoretical. From this it appears that copper has a detrimental effect.

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[37] "Société chimique des Usines der Rhône anct Gilliard," P. Monnet and Cartier; *D. R. P.* No. 95,965; Lassar-Cohn, "Arbeitsmethoden," 4 Aufl., *Spez. Teil*, p. 289.

[38] *Ann.*, 401, 21, 1913.

[39] *Ber.*, 38, 2211 1905.

An experiment was also made in which the potassium salt of *p*-nitrophenol was first made by evaporating to dryness an aqueous solution of *p*-nitrophenol and potassium hydroxide in molecular proportions, drying the salt at 120°, and then refluxing with ethyl bromide in acetone solution as before. 42 Gm. of *p*-nitrophenol gave 19.8 Gm. of the ether, or 39 percent of the theoretical.

An experiment with 42 Gm. of *p*-nitrophenol, 45 Gm. of potassium carbonate, 36 Gm. of ethyl bromide, and 100 Gm. of acetone, heated under pressure at 100°, gave 42 Gm. of the ether, equivalent to 83.1 percent of the theoretical. An increase in pressure appears to be very favorable to the formation of the ether.

Ethylation with Ethyl Bromide under increased pressure, (Method of Hinsberg).—100 Gm. of the dry sodium salt of *p*-nitrophenol, 80 Gm. of ethyl bromide, and 500 Cc. of absolute ethyl alcohol (commercial), were heated in an autoclave at 50 pounds pressure for 8 hours. The alcohol was then distilled off, and the residue treated with steam to separate the ether. The yield was 84 Gm. equivalent to 81 percent of the theoretical.

Ethylation with potassium ethyl sulphate under increased pressure.—100 Gm. of the dry sodium salt of *p*-nitrophenol, 150 Gm. of potassium ethyl sulphate, and 500 Gm. of absolute alcohol (commercial), were heated in an autoclave at 150 pounds' pressure for 8 hours. After distilling off the alcohol, the residue was treated with steam in order to separate the ether. The yield of *p*-nitrophenetol was 80.5 Gm. equivalent to 77.5 percent of the theoretical.

Ethylation with sodium ethyl sulphate under increased pressure.—100 Gm. of the dry sodium salt of *p*-nitrophenol, 150 Gm. of sodium ethyl sulphate, and 500 Gm. of absolute alcohol (commercial), were treated as in the experiment with potassium ethyl sulphate. The yield of *p*-nitrophenetol was 56.5 Gm., equivalent to 54.5 percent of the theoretical. By increasing the quantity of sodium ethyl sulphate to 200 Gm., a yield of 72.2 percent of the theoretical was obtained. Pressures above 150 pounds produced large quantities of tar.

Ethylation with Ethyl Chloride under increased pressure.—100 Gm. of the sodium salt of *p*-nitrophenol, dried at 120°, 100 Gm. of ethyl chloride, and 500 Cc. of absolute alcohol (commercial) were heated in an autoclave at 100 pounds' pressure for six hours. The alcohol was then distilled off, and the residue steam-distilled. The yield of *p*-nitrophenetol was 79 Gm., equivalent to 76.1 percent of the theoretical. Two experiments carried out at 150 pounds pressure gave respectively 84.2 Gm. and 83.7 Gm. of *p*-nitrophenetol, equivalent to 81.2 and 80.7 percent of the theoretical.

CONCLUSION.

Para-nitrophenetol is apparently most economically prepared by heating sodium *p*-nitrophenolate under increased pressure with an alcoholic solution of ethyl chloride.

3. PREPARATION OF *p*-AMINOPHENETOL.

HISTORICAL.

Para-aminophenetol appears to have been first described in detail by E. J. Hallock[40] in 1879. Having obtained a considerable quantity of *p*-nitrophenetol, Hallock attempted to reduce it by means of tin and hydrochloric acid. The resulting salt, after the separation of the tin

[40] *Am. Chem. J.*, 1, 271, 1879.

with hydrogen sulphide, crystallized from water, in which it is very soluble, in rhombic plates of a pearly lustre. An ultimate analysis established its composition as $C_2H_5O.C_6H_4.NH_2.HCl$. These crystals, when treated with potassium hydroxide, yielded an oily liquid resembling aniline and boiling at 235°. A portion of the salt appeared to suffer a further decomposition, so that the amount of oil obtained was very small. Attempts to reduce *p*-nitrophenetol by means of ammonium sulphide were unsuccessful. In 1881 Hallock[41] stated that, although he had prepared a moderately large quantity of *p*-nitrophenetol, he was able to obtain only a small amount of *p*-aminophenetol.

In 1888 Riedel obtained a German patent[42] on a process of making *p*-aminophenetol from itself. In this process one molecule of *p*-aminophenetol is diazotized and coupled with phenol. The resulting ethyl-dihydroxy-azobenzene is then ethylated, forming diethyl-dihydroxy-azobenzene, which is reduced to two molecules, theoretically, of *p*-aminophenetol. The details and equations of this process are given on page 285.

In the process of manufacturing acetphenetidin patented by Hinsberg[43] the *p*-aminophenetol was made by the reduction of *p*-nitrophenetol with iron and hydrochloric acid. For the laboratory Hinsberg[44] recommended that the ether be reduced by means of tin and concentrated hydrochloric acid. Both these methods are described on pages 285 and 286 in detail.

In 1892 Meister, Lucius and Bruning were granted a German patent[45] on a method of preparing *p*-aminophenetol, which consists in condensing benzaldehyde with *p*-aminophenol giving benzylidene-*p*-aminophenol ($C_6H_5.CH = N.C_6H_4.OH$), heating this compound with ethyl bromide and alcoholic sodium hydroxide for 3 hours, and treating the resulting benzylidene-*p*-aminophenetol ($C_6H_5.CH = N.C_6H_4.OC_2H_5$) with dilute acid, when *p*-aminophenetol and benzaldehyde are formed. The benzaldehyde is used to condense more *p*-aminophenol.

In their text-book published in 1894, Bender and Erdmann[46] describe a method for the preparation of *p*-aminophenetol hydrochloride, which is as follows:

"50 grammes of chrysophenin, 100 grammes of zinc dust, and 250 Cc. of hot water are heated in a vessel of about two liters capacity on a water-bath, with vigorous agitation, for one hour. Steam is then passed through the mixture and the vapors condensed in a Liebig condenser. The distillate, which consists of *p*-aminophenetol and water, is shaken out with a little ether. The *p*-aminophenetol dissolves in the ether, from which it is extracted by shaking with 30 Cc. of dilute hydrochloric acid. The ether which has been freed of the base is again used to exhaust the aqueous distillate. The hydrochloric acid solution, on evaporation to dryness, yields *p*-aminophenetol hydrochloride in large plates.

Reaction:

$$C_2H_5O.C_6H_4.N = N.C_6H_3.CH = CH.C_6H_3.N = N.C_6H_4.OC_2H_5$$

$$\qquad\qquad\qquad\qquad\quad | \qquad\qquad | \qquad\qquad\qquad\qquad\

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Reaction:

$$C_2H_5O.C_6H_4.N = N.C_6H_3.CH = CH.C_6H_3.N = N.C_6H_4.OC_2H_5$$
$$\qquad\qquad\qquad\quad | \qquad\qquad\quad |$$
$$\qquad\qquad\qquad SO_3Na \qquad SO_3Na$$

chrysophenin

$$+ 4H_2O = 2C_2H_5O.C_6H_4.NH_2 + NH_2.C_6H_3.CH = CH.C_6H_3.NH_2.$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad | \qquad\quad |$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad SO_3Na \qquad SO_3Na$$

p-aminophenetol — sodium diamido-stilbene-disulphonate.

Chrysophenin (Aurophenine O, Sultan Yellow G) is the sodium salt of disulpho-stilbene-diazo-diphenetol. It is produced by ethylating Brilliant Yellow (Paper Yellow 3 G), which is

[41] *Ber.*, 14, 37, 1881.

[42] *D. R. P.* No. 48,543, 1888; *Frdl.* II, 526.

[43] U. S. Pat. No. 400,086, 1889.

[44] *Ann.*, 305, 276, 1899.

[45] *D. R. P.* No. 69,006, 1892.

[46] Bender and Erdmann, "Anleitung zur darstellung Organischer Chemiker Präparate," 2, 466, 1894.

disulphostilbene-diazo-diphenol.[47] Brilliant Yellow is prepared by coupling phenol with diazotized disulpho-diamino-stilbene. It will be seen that this method of preparing *p*-aminophenetol is perfectly analogous to that of Riedel (see above). The advantages, if any, which it possesses over that method are not stated.

According to Paul,[48] who described a technical process of manufacutring acetphenetidin in 1896, *p*-aminophenetol is made by reducing *p*-nitrophenetol with tin and hydrochloric acid, and precipitating the *p*-aminophenetol hydrochloride by means of concentrated hydrochloric acid, in which it is not very soluble. The details of this method are given on page 288.

In 1915 Hurst and Thorpe[49] reported that when *p*-nitrophenetol is reduced according to the method recommended by Hinsberg, in which tin and *concentrated* hydrochloric acid are used as the reducing agents, approximately equal quantities of *p*-aminophenetol and 3-chlor-4-aminophenetol are formed. It was found that pure *p*-aminophenetol could be obtained by using *dilute* acid, and that under proper conditions the chlorinated *p*-aminophenetol was the sole product with *concentrated* acid.

EXPERIMENTAL.

PREPARATION OF *p*-AMINOPHENETOL FROM *p*-AMINOPHENETOL (METHOD OF RIEDEL, MODIFIED BY THE PRESENT WRITER).

Ethyl-p-dihydroxy-azobenzene, ($C_2H_5O.C_6H_4.N = N.C_6H_4.OH$).—150 Gm. of *p*-aminophenetol were dissolved in a mixture of 380 Cc. of 20 percent hydrochloric acid and 2200 Cc. of water. Ice was added until the temperature fell to 5°. A solution of 76 Gm. (according to Riedel, 70 Gm.) of sodium nitrite in 550 Cc. of water was then added slowly with stirring. A slightly blue coloration was obtained with starch-iodide paper when all the sodium nitrite had been added. The solution of the diazo-compound was then slowly run into a solution of 104 Gm. of phenol and 220 Gm. of crystallized sodium carbonate in 400 Cc. of water. This solution was stirred by a mechanical stirrer, and the stirring continued for one hour after the addition of the diazo solution was completed. The precipitated ethyl-*p*-dihydroxy-azobenzene, which is only slightly soluble in water, and practically insoluble in the presence of alkali carbonates, was filtered off at the pump and dried. It forms a brownish yellow powder, melting at 124.5° (according to Riedel 104.5°, probably a typographical error). Four experiments were made, and the yield in each case was practically quantitative, 264–266 Gm. The theoretical yield is 265 Gm. but the weight of the powder obtained is sometimes slightly more than this on account of the presence of a little inorganic salt.

Diethyl-dihydroxy-azobenzene, ($C_2H_5O.C_6H_4.N = N.C_6H_4.OC_2H_5$).—100 Gm. of dry ethyl-*p*-dihydroxy-azobenzene and 17 Gm. of sodium hydroxide were dissolved in 500 Cc. of alcohol. To this solution 46 Gm. of ethyl bromide were added, and the whole heated in an autoclave ten hours at 150°. The alcohol was then distilled off, the residue washed with water to separate the sodium bromide, and then with a dilute solution of sodium hydroxide to separate any unchanged dihydroxy-azobenzene. The diethyl-*p*-dihydroxy-azobenzene is obtained in the form of brown plates, melting at 156°. The yield is about 100 Gm., or 90 percent of the theoretical.

Para-aminophenetol.—One hundred Gm. of diethyl-*p*-dihydroxy-azobenzene, 60 Gm. of granulated tin, and 500 Gm. of 20 percent hydrochloric acid, were heated

[47] Knecht, Rawson and Loewenthal, "A Manual of Dyeing," 2, 405–6, 1910.

[48] *Z. angew. Chem.*, 1896, 587.

[49] *J. Chem. Soc.*, 107, [2] 934, 1915.

on a water-bath till the azo-compound was completely dissolved; the heating was continued one hour longer. 1000 Cc. of water and 67 Gm. of zinc were then added to the cooled solution. After one hour the precipitated tin was filtered off, washed with water, 180 Gm. of sodium hydroxide, dissolved in water, added to the filtrate, and the mixture steam-distilled. The distillate was collected in 100 Gm. of concentrated hydrochloric acid (33.5 percent), diluted with a little water. The yield was 119 Gm. equivalent to 92.2 percent of the theoretical.

For this reduction Riedel directs the use of 170 Gm. of stannous chloride and 300 Cc. of concentrated hydrochloric acid. The use of tin, and its recovery by means of zinc, reduces the cost of this step considerably.

Theoretically one mol of *p*-aminophenetol yields two mols on treatment by the Riedel method. The foregoing experiments show, however, that only about one and two-thirds mols can be obtained in practice.

PREPARATION OF *p*-AMINOPHENETOL FROM *p*-NITROPHENETOL.

Reduction with stannous chloride and hydrochloric acid.—170 Gm. of crystallized stannous chloride were dissolved in 250 Cc. of 20 percent hydrochloric acid. To this solution 42.4 Gm. of *p*-nitrophenetol were added, and the mixture heated on a water-bath for two hours. To the cooled solution 300 Gm. of sodium hydroxide dissolved in water were added, and the mixture then distilled with steam. The distillate was collected in 30 Gm. of concentrated hydrochloric acid, diluted with a little water. On evaporating the distillate, 36.1 Gm. of *p*-aminophenetol hydrochloride were obtained, equivalent to 82.2 percent of the theoretical.

Reduction with Tin and Hydrochloric Acid.—33.4 Gm. of *p*-nitrophenetol, 47.6 Gm. of granulated tin, and 328.5 Gm. of 20 percent hydrochloric acid were heated on a water-bath for two hours. The solution was then diluted with water and 52.4 Gm. of zinc added. After one hour the tin was filtered off, washed, and the filtrates made alkaline with 144 Gm. of sodium hydroxide dissolved in water. The mixture was then distilled with steam, and the distillate collected in 25 Gm. of concentrated hydrochloric acid diluted with water. On evaporating the distillate, 29.8 Gm. of *p*-aminophenetol hydrochloride were obtained, equivalent to 86 percent of the theoretical.

Reduction with Iron and Hydrochloric Acid.—167 Gm. of *p*-nitrophenetol, 35 Gm. of concentrated hydrochloric acid, and 250 Cc. of water were placed in a flask provided with a condenser and mechanical agitator, and heated on the water-bath at a temperature from 70° to 80°. To this mixture 140 Gm. of iron powder were gradually added. The heating was continued for about two hours after the addition of the iron was completed. The mixture was then made alkaline with 25 Gm. of chalk and subjected to steam distillation. The distillate was collected in dilute hydrochloric acid. On evaporating the acid solution, 155 Gm. of *p*-aminophenetol hydrochloride were obtained, equivalent to 89.3 percent of the theoretical.

For this reduction Hinsberg directs the use of 250 Gm. of hydrochloric acid, 250 Gm. of water and 104 Gm. of iron. If concentrated hydrochloric acid is intended, this quantity is far in excess of that required, one-tenth of this quantity being sufficient. The amount of iron used is insufficient; theory (two reactions are possible) requires 112–168 Gm. In practice the mean is usually taken, which is 140 Gm.

The *p*-aminophenetol can also be absorbed in sulphuric acid, but the sulphate is more difficult to dry than the hydrochloride.

Reduction with Sodium Sulphide and Sulphur.—In the experiments tabulated below the following procedure was used: The crystallized sodium sulphide (33 percent), sulphur and water were boiled together under a reflux condenser for one hour. The *p*-nitrophenetol was added gradually to this solution, and the mixture boiled, with turbining, for several hours. The cooled mixture was then extracted with ether, and the ethereal solution shaken with diluted hydrochloric acid. On evaporating the acid solution *p*-aminophenetol hydrochloride is obtained, and on evaporating the ethereal solution the unchanged *p*-nitrophenetol is recovered.

Para-nitrophenetol. Gm.	Sodium sulphide. Gm.	Sulphur. Gm.	Water. Gm.	Para-aminophenetol. Gm.	Yield. Percent.
33.4	48	6.4	40.0	19.1	55.2
33.4	81	10.8	67.5	22.0	63.5
33.4	81	10.8	140.0	26.4	76.0
33.4	81	10.8	300.0	28.6	82.6
33.4	60	8.0	300.0	25.8	74.5
33.4	60	8.0	500.0	24.2	70.0

The proportions given in the first experiment are those required by theory. It is of interest to note that the yield is increased, up to a certain point, by an increase in the quantity of water.

The method above-described is very convenient for the preparation of small quantities of *p*-aminophenetol hydrochloride. On a large scale the reduction mixture is allowed to stand until two layers separate. The upper layer, consisting of *p*-aminophenetol and unchanged *p*-nitrophenetol, is then separated from the lower aqueous layer, and the *p*-aminophenetol and *p*-nitrophenetol separated by fractional distillation, preferably in vacuo.

CONCLUSION.

Para-aminophenetol is apparently most economically prepared by heating *p*-nitrophenetol with iron and dilute hydrochloric acid.

4. PREPARATION OF ACETYL-*p*-AMINOPHENOL.

HISTORICAL.

In 1878 Morse[50] reported that when *p*-nitrophenol is reduced with tin and glacial acetic acid acetyl-*p*-aminophenol is produced, reduction and acetylation occurring in one operation.

In 1907 Tingle and Williams[51] published an article, from which it appears that many of the chemists who tried the method recommended by Morse failed to obtain the compound. In reply to a letter from these writers Morse stated that the best results would be obtained by the use of absolutely anhydrous acetic acid. These writers therefore used in their experiments glacial acetic acid to which acetic anhydride had been added in quantity exactly sufficient to raise the acid content to 100 percent. By means of this mixture and by carefully excluding moisture from the apparatus they were able to obtain a yield of 47 percent of the theoretical. Their method is described as follows:

"Para-nitrophenol (12 grammes, 1 mol.) was mixed in a capacious, round-bottomed flask with glacial acetic acid, 50 grammes = 10.5 mol., to which sufficient recently distilled acetic anhydride had been added to bring the acid content to 100 percent. The flask was attached to a long reversed condenser, suitably protected from the moisture of the atmosphere, and the

[50] *Ber.*, 11, 232, 1878.

[51] *Am. Chem. J.*, **37**, 51, 1907.

contents of the flask were heated until the nitrophenol had dissolved. To this solution granulated tin, 15 grammes, was added. The reduction commenced immediately and the reaction quickly became very vigorous. It is desirable to allow the reaction to proceed as rapidly as is possible without loss of substance. As soon as the reaction moderates, a second portion of tin, 15 grammes, is added, and, if necessary, external heat applied to bring practically all the metal into solution. The liquid is now poured into 2 liters of water, the mixture warmed and a current of hydrogen sulphide passed into it until no further precipitate of stannous sulphide takes place. Sometimes it is convenient to filter the liquid through cheese cloth before all the tin has been thrown down and then, later, to make a final filtration through paper. The clear filtrate is concentrated until crystals appear; after being cooled the crystals are drained and recrystallized twice from 95 percent alcohol."

These authors also obtained the compound by the action of tin amalgam on the nitrophenol, in the presence of acetic acid of 100 percent concentration. The experiments were carried out in an apparatus of special construction, in which the tin amalgam was produced continuously by means of an electric current. The yield by this method was about 40 percent of the theoretical.

In 1903 Dahl and Company,[52] who were interested in the preparation of acetyl-*p*-aminophenol for use in the manufacture of dyestuffs, stated that the compound was best prepared by heating *p*-aminophenol with glacial acetic acid.

In 1905 Lumiere and Barbier[53] in the course of their work on acetylation in aqueous solution prepared it by shaking a solution of 10.9 Gm. of *p*-aminophenol in 100 Cc. of water and 7 Gm. of acetic acid with 12.3 Gm. of acetic anhydride.

CONCLUSION.

Acetyl-*p*-aminophenol is apparently a comparatively expensive intermediate, the use of which in the manufacture of acetphenetidin is not economical.

PREPARATION OF ACETPHENETIDIN.

HISTORICAL.

Hallock,[54] who first made acetphenetidin, prepared it by the action of acetyl chloride on *p*-aminophenetol, but apparently did not attempt the purification of the resulting crystalline solid.

In the technical process patented by Hinsberg,[55] the hydrochloride of *p*-aminophenetol is melted with fused sodium acetate and glacial acetic acid, the melted mass repeatedly boiled with water, and the acetphenetidin obtained from the filtrates after cooling. This product is crude and requires purification, but no method for this purification is described in the patent-specification.

The method described by Paul[56] is essentially the same as the preceding, but more details are given. The *p*-aminophenetol hydrochloride, sodium acetate, and glacial acetic acid are heated under a reflux condenser for three hours, the solution then dissolved in 10 parts of boiling water, and freed from resinous impurities by filtering. After cooling the acetphenetidin crystallizes out with a faint red color. By recrystallization from water with the aid of animal charcoal pure acetphenetidin is obtained.

For use in the laboratory Hinsberg[57] recommended acetylation by vigorously shaking *p*-aminophenetol in a separatory funnel with ice-water and an excess of acetic anhydride (about 1.5 molecular weights to 1 molecular weight of *p*-aminophenetol), filtering off the acetphenetidin after the disappearance of the anhydride, and crystallizing from dilute alcohol with the aid of animal charcoal.

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[52] *Chem. Zentr.*, 2, 1227, 1903.
[53] *Ibid.*, 2, 465, 1905.
[54] *Am. Chem. J.*, 1, 271, 1879.
[55] U. S. Pat. No. 400,086, 1889.
[56] *Z. angew. Chem.*, 1896, 587.
[57] *Ann.*, 305, 276, 1899.

In this same article Hinsberg states that *p*-aminophenetol may also be acetylated by boiling with glacial acetic acid. Platt[58] states that acetphenetidin is made commercially by treating *p*-aminophenetol with anhydrous acetic acid. In Klimmek's process[59] equimolecular quantities of *p*-aminophenetol and glacial acetic acid are heated together in a flask having a return condenser and maintained at a temperature of 100° in a water-bath for from 4 to 5 hours. This solution is then thrown into 80 parts of boiling water, a sufficient quantity of animal charcoal having been added to secure, on filtration, a perfectly clear liquid. The solution is filtered while hot and allowed to crystallize rapidly. It is stated that the large amount of water above-mentioned thoroughly dissolves the solids, so that all the impurities and coloring matter are absorbed by the charcoal. After separating the water and drying the solid, pure acetphenetidin is obtained.

To go from acetyl-*p*-aminophenol to acetphenetidin, Täuber[60] directs that acetyl-*p*-aminophenol, potassium ethyl sulphate, and sodium hydroxide, dissolved in 60 percent alcohol, be heated at 150° for several hours. On diluting the resulting solution with water, acetphenetidin separates out in fairly pure crystals. Hinsberg[61] directs that acetyl-*p*-aminophenol and an equivalent part of sodium hydroxide and ethyl bromide or ethyl iodide, dissolved in sufficient alcohol to form a clear solution, be warmed on a water-bath for two or three hours under a reflux, and then diluted with water. In case pure acetyl-*p*-aminophenol is used, the purity of the acetphenetidin which separates out is said to be such that usually no further purification is required.

EXPERIMENTAL.

Acetylation of p-Aminophenetol.—68.5 Gm. of *p*-aminophenetol and 36 Gm. of glacial acetic acid were mixed in a flask fitted with an air-condenser, and boiled on a sand-bath for eight hours. The tube forming the air-condenser was of such a length that the water-vapor could escape, while the acetic acid and *p*-aminophenetol were condensed. The liquid was then poured into 300 Cc. of hot water containing 10 Cc. of hydrochloric acid, well stirred, and after cooling filtered at the pump and washed with a little cold water. The crude acetphenetidin obtained in this way has a lavender color. It was purified by dissolving in 80 parts of boiling water, adding 20 Gm. of animal charcoal, and boiling until the liquid was colorless. This operation is most satisfactorily carried out in the kind of apparatus used for steam distillation; the acetphenetidin dissolves more readily, the mixture is kept stirred by the steam, and the volume of water can be kept practically unchanged. When the liquid was decolorized the mixture was filtered at the pump, and the filtrate cooled rapidly with stirring. The pure acetphenetidin was then filtered off and dried. A yield of 69.6 Gm., equivalent to 77.8 percent of the theoretical, was obtained.

By using 50 Gm. of glacial acetic acid, a yield of 76 Gm. was obtained, equivalent to 85.8 percent of the theoretical.

Acetylation of p-Aminophenetol Hydrochloride.—83.5 Gm. of *p*-aminophenetol hydrochloride, 43.5 Gm. of fused sodium acetate, and 41.5 Gm. of glacial acetic acid, were treated exactly as described in the foregoing experiments. The yield was 72.8 Gm. equivalent to 84.3 percent of the theoretical.

With 36 Gm. of glacial acetic acid the yield was 68 Gm. equivalent to 76 percent of the theoretical.

Acetylation of p-Aminophenetol Sulphate.—93 Gm. of *p*-aminophenetol sulphate, 42.5 Gm. of fused sodium acetate, and 42.5 Gm. of glacial acetic acid, were

[58] *J. Anal. Appl. Chem.*, 7, 79, 1893.
[59] U. S. Pat. No. 006,288, 1898.
[60] *D. R. P.* No. 85,988, 1894.
[61] *Ann.*, 305, 276, 1899.

treated exactly as above-described. The yield was 75.3 Gm. equivalent to 84.1 percent of the theoretical.

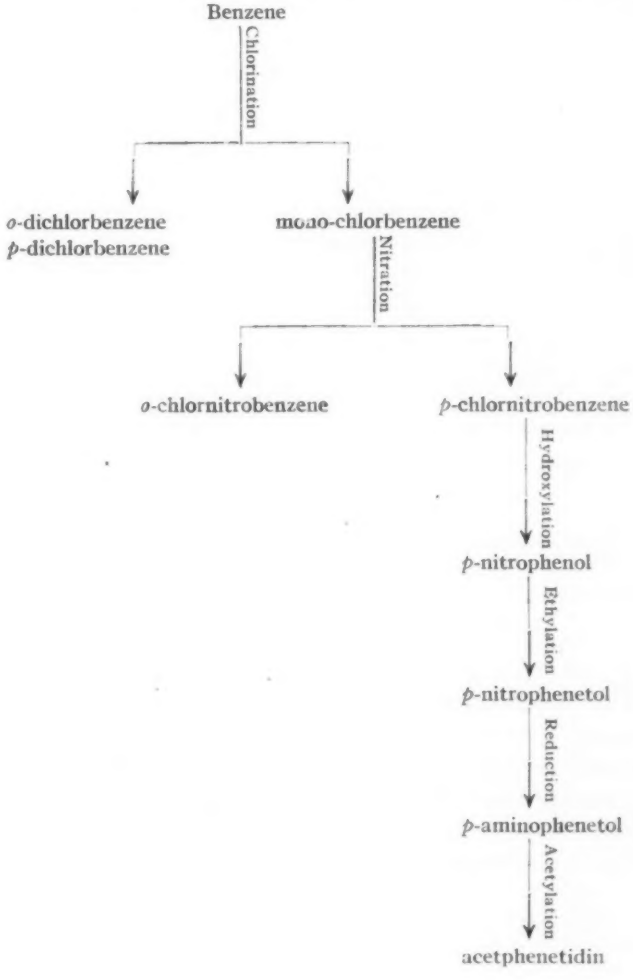
CONCLUSION.

Since *p*-aminophenetol hydrochloride is more readily obtained than the sulphate or the free base, acetphenetidin is apparently most economically prepared by heating the hydrochloride with fused sodium acetate and glacial acetic acid.

PROCESS RECOMMENDED FOR THE MANUFACTURE OF ACETPHENETIDIN.

1. PLAN.

The studies of the preceding chapters have eliminated the methods of Riedel and Taüber, on account of their high cost of production, and have shown that the method of Hinsberg admits of substantial improvements. The process recommended, which includes these improvements, is based on the plan given below.



For completeness, the hydrocarbon benzene is here made the starting-point; it seems preferable, however, to regard the synthesis of acetphenetidin as beginning with *p*-chlornitrobenzene, since from this intermediate it follows a direct course, no by-products forming.

2. CRUDES AND APPARATUS.

The crudes which are required in carrying out the complete process as outlined above are benzene, chlorine, sodium hydroxide, nitric acid, sulphuric acid, hydrochloric acid, acetic acid, sodium acetate, ethyl chloride, and iron. Those manufacturers who chlorinate benzene obtain both chlorine and sodium hydroxide by the electrolysis of sodium chloride, and obtain hydrochloric acid as a by-product of the chlorination. By efficient operation, the sulphuric acid and acetic acid can be largely recovered, the latter as sodium acetate. Ethyl chloride is very easily and cheaply made from ethyl alcohol and hydrochloric acid by well-known methods.

No unusual apparatus is required in carrying out the operations of this process.

3. OPERATIONS.

PREPARATION OF CHLORBENZENE.[62]

300 parts of benzene are mixed in a suitable vessel with 1 part of anhydrous ferric chloride and 1 part of powdered iron, and 150 parts of dry chlorine are led into the mixture. The hydrogen chloride which is evolved is absorbed in water. After all the chlorine has passed in, the mixture is fractionally distilled *in vacuo*. The first fraction consists chiefly of unchanged benzene, which is returned to the apparatus for further chlorination (requiring about 80 parts of chlorine). The second fraction consists chiefly of mono-chlorbenzene, and the third fraction of dichlorbenzene. On cooling the third fraction, pure *p*-dichlorbenzene crystallizes out, and is separated from the oily mother-liquor. The mother-liquor consists of approximately 75 percent of ortho- and 25 percent of para-dichlorbenzene. Yield, 335 parts of mono-chlorbenzene, 24 parts of *p*-dichlorbenzene, 13 parts of mixed ortho- and para-dichlorbenzene, and 115 parts of hydrochloric acid.

NOTES.

The catalysts, ferric chloride and iron, can be used indefinitely. The chlorination is interrupted before all the benzene is acted on, in order that the conditions may not favor the formation of *p*-dichlorbenzene.

PREPARATION OF CHLORNITROBENZENE.

A mixture of 100 parts of nitric acid (sp. gr. 1.42) and 150 parts of sulphuric acid (sp. gr. 1.84) is introduced into a suitable apparatus fitted with an agitator and a condenser. 100 parts of mono-chlorbenzene are slowly run in, while the agitator is kept in rapid movement and the temperature maintained around 25°. When the greater part of the chlorbenzene has been added, the temperature is raised by external heat to 70–80°. After all the chlorbenzene has been added the stirring and heating are continued until there is no further reaction. The mixture

[62] *D. R. P.* No. 219,242; *J. Soc. Chem. Ind.*, 1910, 617; *Chem. Zentr.*, 81, 1074, 1910; cf. *Chem. Eng.*, [1] 25, 22, 1917.

is allowed to stand until the chlornitrobenzene separates as an oil on the surface of the acid. The acid is drawn off at the bottom, and the chlornitrobenzene washed with warm water.

Separation.[63]—The mixture of ortho- and para-chlornitrobenzene is cooled to about 16°, when the greater part of the para-isomer crystallizes out, and is separated from the oily mother-liquor. The oil is fractionated *in vacuo;* the para-isomer concentrates in the first fraction, and the ortho derivative in the second fraction. On cooling these fractions a portion of the pure isomer crystallizes out and is separated. The process of fractionation and crystallization is repeated until the separation is complete. Yield, 95–100 parts of *p*-chlornitrobenzene, and 35–37 parts of *o*-chlornitrobenzene.

NOTES.

The spent-acid may be "regenerated" by evaporating in the usual way, and used again for nitrating.

PREPARATION OF SODIUM *p*-NITROPHENOLATE.

Sixty-five parts of sodium hydroxide are dissolved in 1300 parts of water, and the solution introduced into an autoclave. One hundred parts of *p*-chlornitrobenzene are added, and the mixture heated for about eight hours at a pressure of 80 pounds. While still hot the solution is filtered, and evaporated to a small volume. After cooling the sodium *p*-nitrophenolate is separated from the mother-liquor and dried at 120°. Yield, 95–100 parts.

PREPARATION OF *p*-NITROPHENETOL.

One hundred parts of dry sodium *p*-nitrophenolate, 100 parts of ethyl chloride, and 500 parts of alcohol are mixed in an autoclave, and heated at a pressure of 150 pounds for about six hours. While still warm the solution is removed, the alcohol distilled off, and the residue washed with cold water. Yield, 95–100 parts of crude *p*-nitrophenetol, containing 85–90 percent of pure ether. For purification the crude ether is steam-distilled. Yield, about 85 parts.

NOTES.

The unchanged *p*-nitrophenol can be recovered from the wash-waters by acidifying and evaporating to crystallization.

For conversion into *p*-aminophenetol it is unnecessary to purify the *p*-nitrophenetol.

PREPARATION OF *p*-AMINOPHENETOL HYDROCHLORIDE.

One hundred parts of *p*-nitrophenetol (120 parts if crude), 150 parts of water, and 10 parts of hydrochloric acid, are mixed in a suitable vessel fitted with a condenser, an agitator and a direct-steam coil, and heated to 70°. Eighty-five parts of finely ground cast iron are added at such a rate that the temperature is maintained at about 70°, the mixture being stirred continuously. When all the iron has been added the heating is continued by steam until the reduction is complete. The contents are distilled with superheated steam, and the distillate collected in 65 parts of hydrochloric acid (s. g. 1.17). The distillate is evaporated to dryness. Yield, 90–95 parts.

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[63] *D. R. P.* No. 97,013; *Frdl.* V, 48; *Chem. Zentr.*, 2, 238, 1898.

NOTES.

The reduction is complete when a portion of the distillate, acidified with hydrochloric acid, leaves no undissolved oil or solid.

The steam-distillation is complete when a portion of the distillate, treated with a solution of ferric chloride, gives no purple or violet coloration.

PREPARATION OF ACETPHENETIDIN.

One hundred parts of *p*-aminophenetol hydrochloride, 48 parts of fused sodium acetate, and 48 parts of glacial acetic acid, are mixed in a suitable vessel fitted with a condenser, and boiled for about eight hours. The excess of acetic acid is distilled off, and the residue washed with 500 parts of cold water containing 10 parts of hydrochloric acid. The crude acetphenetidin is dissolved in 8000 parts of boiling water, 25 parts of animal charcoal added, and the mixture boiled until the liquid is colorless. The mixture is filtered, and the filtrate cooled quickly with vigorous stirring. The pure acetphenetidin is filtered off and dried. Yield, 85–90 parts.

NOTES.

The distillate of acetic acid can be used to make sodium acetate for another acetylation by neutralizing with sodium carbonate, evaporating and fusing.

The wash-water, containing unchanged *p*-aminophenetol hydrochloride, and coloring-matter, can be treated with chalk, and the *p*-aminophenetol distilled over with steam.

The filtrate from the pure acetphenetidin contains about 6 parts of acetphenetidin in solution, which can be obtained by evaporating the liquid.

The animal charcoal can be revivified by gentle ignition in closed tubes.

4. CONCLUSION.

The process above-described is capable of producing acetphenetidin at a very low cost compared with the older methods. The materials required are cheap and easily accessible; the operations involved are simple; and the yields at each step are good. Only subordinate quantities of by-products are formed, and these occur in the earlier and less important phases of the synthesis.

ABBREVIATIONS.

The following abbreviations have been used in the bibliographical references:

Am. Chem. J.—*American Chemical Journal.*
Ann.—*Justus Liebig's Annalen der Chemie.*
Ann. chim. phys.—*Annales de chimie et de physique.*
Arch. exp. Path. Pharm.—*Archiv für experimentelle Pathologie und Pharmakologie.*
Ber.—*Berichte der Deutschen chemischen Gesellschaft.*
Berl. klin. Wochschr.—*Berliner klinische Wochenschrift.*
Brit. Pat.—British Patent.
Bull. acad. St. Pétersb.—*Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg.*
Bull. classe phys.-math.—*Bulletin de la classe physico-mathématique.*
Chem. Eng.—*Chemical Engineer.*
Chem. Zentr.—*Chemisches Zentralblatt.*
D. R. P.—*Patentschrift des Deutschen Reiches.*
Frdl.—*Friedlander's Fortschritte der Teerfarbenfabrikation.*
Gazz. chim. ital.—*Gazetta chimica italiana.*
J. Am. Chem. Soc.—*Journal of the American Chemical Society.*
J. Anal. Appl. Chem.—*Journal of Analytical and Applied Chemistry.*
J. Chem. Soc.—*Journal of the Chemical Society.*

J. prakt. Chem.—Journal für praktische Chemie.
J. Roy. Soc. Arts.—Journal of the Royal Society of Arts.
J. russ. phys. chem. Ges.—Journal der russischen physikalisch-chemischen Gesellschaft.
J. Soc. Chem. Ind.—Journal of the Society of Chemical Industry.
Jsb. Chem.—Jahresbericht der Chemie.
Lehrb. (Kekulé).—*Lehrbuch der Organischen Chemie, by Aug. Kekulé.*
Rec. trav. chim.—Recueil des travaux chimiques des Pays-Bas.
U. S. Pat.—United States Patent.
Z. angew. Chem.—Zeitschrift für angewandte Chemie.
Z. Chem.—Zeitschrift für Chemie.
Z. klin. Med.—Zentralblatt für klinische Medizin.
Z. med. Wiss.—Zentralblatt für medizinischen Wissenschaften.
Z. physik. Chem.—Zeitschrift für physikalische Chemie.

With a few exceptions, the above abbreviations are those recommended and used in *Chemical Abstracts* (see *Chemical Abstracts*, 1908, Vol. 2).

CONIUM MACULATUM L., AND AETHUSA CYNAPIUM L., AN ADULTERANT.*

BY CLARE OLIN EWING, ERNEST E. STANFORD, AND JOSEPH F. CLEVENGER.

Conium maculatum L., the Greater or Poison Hemlock, was known in ages past as a poisonous plant. It is asserted to have been the state poison of the ancient Greeks, and its use in early medicine is reported by Dioscorides. The plant was introduced to more recent practice by Störck[11], who employed it in a wide variety of conditions. According to Henry[7], *Conium* contains a series of six alkaloids, to whose action its medicinal properties have been commonly attributed. Coniine, the principal member of the series, was isolated by Giesecke in 1827. Other alkaloids occur only in minute amounts, and the mixture is usually known by the name of its most important representative—coniine. While hemlock enjoyed a considerable vogue for a time, the uncertainty of its preparations soon put it into disfavor. Harley,[5] investigating its physiological effects upon himself and others, considered the dried plant and its preparations therapeutically worthless. He extolled, however, the virtues of the juice expressed from the fresh plant. Farr and Wright[3] investigated the alkaloidal content of different parts of the plant, and of plants of different ages. With respect to the herb, they found alkaloids to be chiefly produced during the flowering and fruiting period. Wide variations were apparent in the alkaloidal yield of different specimens of the same growth stage. They found the alkaloidal yield of the fruit to be much above that of the herb, to culminate just before maturity, and thereafter to diminish. Harley[5] and others have reported little or no coniine at all in the dried herb. Both the seed and the herb, moreover, especially the latter, are said to deteriorate rapidly during storage, owing no doubt to the volatility of the alkaloids. Because of their uncertainty of composition *Conium* leaves have largely disappeared from prescriptive practice, and from the official standards. *Conium* seed is retained in the National Formulary IV but is not a drug of great importance.

Aethusa cynapium L., the so-called Lesser Hemlock or Fool's Parsley, has been

* Contribution from Pharmacognosy Laboratory, Bureau of Chemistry, Department of Agriculture, Washington, D. C.

frequently confused with *Conium*. Both the fetid odor and the poisonous properties usually ascribed to *Aethusa cynapium* have been held due to this confusion. Several deaths have been attributed to its confusion with parsley. Harley,[6] who studied the green plant, has pronounced it to be non-toxic. Tanret[12] found neither alkaloid, glucoside, nor other body to which he could attribute toxic action, but Power and Tutin,[10] whose chemical studies are the most detailed of any on the subject seen by the present writers, have asserted it to contain a minute amount of alkaloids resembling those of hemlock. Preparations of the plant made by Power and Tutin exerted a physiological action resembling that of hemlock. Other investigators, whose findings are discussed by Power and Tutin, have expressed a similar diversity of opinion as to the chemistry and toxicology of the plant. *Aethusa* is included in the homeopathic pharmacopoeias, but we understand is rarely, if ever, used. It has apparently found no favor with the allopathic or eclectic schools of medicine.

A recent importation of "Conium leaves" proved to consist chiefly, not of *Conium*, but of *Aethusa*. While the confusion of these plants has repeatedly received mention in the literature, the differential data usually given are but brief, and refer chiefly to the floral characters, especially to those of involucre and involucels. By these, when the flower is present, the two species may be distinguished with comparative ease. In the case in question, however, the sample was almost destitute of flowers, a condition not infrequently found in commercial specimens. The few flowers present were indeed chiefly those of *Aethusa*, but might easily have been furnished by a small accidental admixture of that species. The appended tabulation (Table 1) has been prepared by examination of the specimens in question, and of authentic herbarium material of the two species, and confirmed and extended by consultation of the texts of Gray,[4] Britton and Brown,[2] Bentley and Trimen,[1] and Millspaugh,[8] and, together with the figures, may be of value in the differentiation of *Conium* and *Aethusa*. The characters of the leaflets which, so far as we are aware, have not hitherto been accentuated for this purpose in the literature of drug adulteration, form the chief means of distinguishing the foliage as it occurs in the drug. Dr. Arno Viehoever, of this laboratory, who has collected both plants in their native habitat, informs us that he also has observed these characteristics and has found them very serviceable in the differentiation of the species.

In further explanation it may be said that the foliage of *Conium*, as may be seen from Plate I, is much denser than that of *Aethusa* (Plate II), and this difference may readily be noted on comparison of the drug products. This density of foliage, and the characters of the leaflets (Fig. 1) are, except for the floral characters, the most apparent ready bases for distinguishing the products as they appear in commerce. The leaflets of the lower leaves of *Aethusa* (Fig. 1-*b*) resemble those of *Conium* (Fig. 1-*c*) much more closely than do those of the upper leaflets (Fig. 1-*a*). Modrakowski,[9] whose original paper has not been available, uses the characters of the leafstalks for differentiation between *Conium* and several other adulterants. In the abstract seen the characters of the *Conium* leafstalks are not given. As for *Aethusa*, " . . . . . the transverse section . . . . . shows in its upper channeled surface a large central cell developed in the form of a trichome or hair from the central epidermal cell. . . . . " Sections of *Conium* and

Aethusa were made to test the value of this characteristic. In the material at hand the character seemed less well adapted to routine differentiation than those of the leaflets described.

TABLE 1.—DIFFERENTIAL CHARACTERISTICS OF *Conium maculatum* AND *Aethusa cynapium*.

	Conium maculatum L.	*Aethusa cynapium* L.
Duration of life	Biennial	Annual
Height	2 to 6 feet.	6 inches to 2 feet, rarely 4 feet.
Type of growth	Erect, coarse, much branched, branches corymbose above.	Erect, rather slender, much branched, branches ascending.
Stems	Large, hollow, striate, smooth, green, *purple mottled or spotted.*	Smaller, hollow, sometimes solid above, slightly swollen at the nodes, striate, smooth, sometimes tinged with red or purple, but not characteristically mottled or spotted.
Leaves	First and basal leaves very large, sometimes reaching length of 2 feet, usually alternate and rather long-petioled, deltoid, pinnate; upper leaves much smaller, short-petioled or sessile, sometimes opposite or three together, bi-pinnate or tri-pinnate; glabrous.	Basal leaves not pronouncedly larger than upper leaves, slender-petioled, bi- or tri-pinnate; upper leaves more nearly sessile, bi- or tri-pinnate, alternate, glabrous.
Petiole-bases	Dilated, sometimes abruptly so, stem-clasping or sheathing.	Dilated, with membranous edges; usually sheathing an axillary branch.
Main petioles	Round, or slightly channeled.	Usually distinctly channeled.
Leaflets	Very numerous, usually nearly sessile, *lanceolate-oblong, deeply incised, with dentate, quite sharply pointed segments,* bases subacute, sessile, or narrowing abruptly to a very short-winged petiole.	*Rhomboid-oval, deeply lobed, the segments sometimes further lobed, narrow to linear, abruptly pointed or blunt;* bases acute, sometimes sessile, usually narrowing to a short-winged petiole.
Involucre	*Present,* of *4-8 bracts.*	*Usually absent,* a *single bract* sometimes present.
Involucels	*Of three or four small spreading bractlets.*	*Of 3 (sometimes 1 to 5) long, pendulous linear-awl-shaped stiff bracts hanging down prominently below the umbellet.*
Flowers	Small, white, inner often barren, *produced second year only.*	Small, white.
Fruit	Broadly ovate, ribbed, ribs narrower *than the intervals.*	Globose ovate, prominently corky-ribbed, the ribs *broader than the intervals.*

Another character often cited as a test for hemlock consists in the "mousey" odor evolved on rubbing the leaves with a solution of caustic alkali. The odor of the fresh plant of *Aethusa* has been usually described as fetid and disagreeable, but according to Harley,[6] whose statement is supported by Power and Tutin,[10] it is merely faint and parsley-like. That the latter workers demonstrated the presence of a coniine-like mixture of alkaloids in *Aethusa* and that the test may be given by *Conium* with extremely low alkaloid content would indicate that *Aethusa* under some conditions at least, might also give it.

The sample in question, although containing only a small amount of *Conium*,

yielded the "mousey" odor distinctly. Separated leaves of *Aethusa* also gave it faintly, although it is not altogether improbable that this may have been due to their long association with the hemlock. A small amount of authentic botanical material of *Aethusa cynapium* yielded no coniine odor; this was, however, of considerable age, and it was impossible definitely to settle this question.

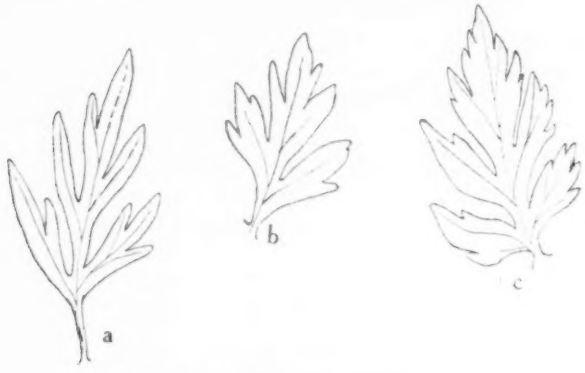

FIG. 1.—LEAFLETS OF CONIUM AND AETHUSA.
(a) Upper leaflet of *Aethusa*; (b) Lower leaflet of *Aethusa*; (c) Leaflet of *Conium*.
(For description, see Table 1.)

Conium maculatum L.

Aethusa cynapium L.

It was thought that alkaloidal assay might possibly furnish corroborative evidence regarding the identity of the suspected specimens. In carrying out these determinations it was found that the method of the National Formulary for *Conium* seed could not be followed exactly for the herb, since the larger volume occupied

by the specified weight of the sample (15 Gm.) retained too large a proportion of the solvent. The method was accordingly modified by using 30-gramme samples, macerating with 300 Cc. of petroleum ether, and decanting 200 Cc., representing 20 grammes of the drug, for analysis. The procedure, which furnished a 20-gramme sample as a working basis, was furthermore advantageous because the alkaloidal content of the herb is so extremely low. Analysis of a commercial specimen of an apparently good grade of *Conium* showed 0.013 percent of alkaloid; one sample in which *Conium* predominated contained 0.0008 percent; the analyses of two samples consisting chiefly of *Aethusa* showed 0.0013 and 0.0002 percent. These analytical results are of about the same order of magnitude as those of Power and Tutin,[10] who reported 0.00023 percent in a fresh specimen of *Aethusa*, which would be equivalent to about four times that amount in the dried material. While, because of the lack of concordance in these figures, as well as the previously reported extreme variability in the alkaloidal content of *Conium*, the results obtained could not be considered as furnishing even corroborative evidence as to the identity of the samples, they are thought, nevertheless, to be worthy of record. It is a matter of conjecture whether the low yield of coniine by the sample consisting largely of *Conium* as well as by the commercial specimen, should be attributed to loss of the volatile alkaloid during storage and perhaps also to the fact that the material in both instances was collected before flowering.

As the clinical results of *Conium* administration are attributed to the alkaloids, the alkaloidal content of the material might well be taken into consideration. It would seem that *Conium* herb, because of its notorious variability and its previously reported rapid deterioration, might properly be entirely deleted from the materia medica; the more so as the fruit of the plant (*Conium* N. F.) contains the alkaloids of hemlock in very much larger amounts. If the herb is used at all, the flowering or fruiting plant should probably be preferred. Nothing in the literature, or the analytical results of the present writers or of Power and Tutin,[10] indicates that *Aethusa* herb is of any practical therapeutic value.

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PHARMACOGNOSY LABORATORY
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ATROPA BELLADONNA.*

BY GEORGE P. KOCH.

INTRODUCTION.†

In the last three years the cultivation of belladonna in the United States has been greatly stimulated by the high prices paid for the crude drug. The advance in price was due to the lack of shipping, hampering importations, and to the fact that foreign countries which previously supplied our markets were at war, and were utilizing their land and time in the production of human food.

Many plants are utilized for medicinal purposes, but the relative amounts are small when compared with staple crops, such as corn, wheat and potatoes. Stockberger[14] states that in 1917 approximately 100 acres of belladonna were grown in the United States, and that the cultivation of more than 500 acres of this crop might cause over-production. Since the market price for belladonna is 500 to 600 percent higher now (September 1918) than it was before the war, we would infer that we had as yet not reached the point of over-production. Stockberger[13] also summarizes drug plant culture, which may well apply to belladonna—"the problems presented by the cultivation of drug plants are not less difficult than those encountered in the production of many other crops. Drug plants are subject to the same diseases and risks as other crops, and are similarly affected by variations in soil and climatic conditions. They require a considerable outlay of labor, the same as other crops, and likewise require intelligent care and handling."

Scientific investigations dealing with the cultivation of belladonna, as with other medicinal plants, have been carried out principally by pharmaceutical houses, state experiment stations and universities, which maintain drug gardens. While published scientific investigations deal with all phases of belladonna culture, from a practical standpoint, much information is still necessary in order to be successful with this crop.

The author has studied various phases of belladonna culture with the thought of using the results in practice.

STUDY OF THE GERMINATION OF BELLADONNA SEEDS.

Belladonna seeds germinate very slowly and irregularly. Haynes and Newcomb[6] state that a small part of the seed germinated in two or three weeks, while the remainder germinated in four to five weeks. Sievers[11] concluded that late fall sown seeds germinate much sooner in the spring than seeds sown in the spring.

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He also states the first seeds germinate in about three weeks while the bulk begin to germinate between the fourth and fifth week. Sievers[11] found that treating belladonna seeds with sulphuric acid was of no great value in hastening the germination. Treatment with hydrogen peroxide was found to be very beneficial. Moistening the seeds and then subjecting them to a temperature of —12° C. for five hours materially hastened germination.

To determine the length of time required for belladonna seeds to germinate, the following experiment was made: In each of two flats (12 × 20″) of soil, one thousand viable belladonna seeds were planted at a depth of one-fourth inch. The number of seeds that germinated was counted after two, three and five weeks. The results are shown below.

TABLE 1.—TABLE SHOWING THE PERCENTAGE OF GERMINATION OF BELLADONNA SEEDS.

	Percentage Germination.		
Flat No.	2 Weeks.	3 Weeks.	5 Weeks.
1	3.7	7.6	10.4
2	3.0	6.6	9.0

The results show that very few belladonna seeds germinate in the first three weeks and only ten percent after five weeks.

Since Sievers[11] found that freezing belladonna seeds for a short time was effective in hastening germination, an experiment including this factor was carried out. About 25 grammes of belladonna seeds were moistened and then placed in a large test tube. After subjecting these seeds to a temperature of —12° C. for six hours they were dried at room temperature. One thousand of these seeds were planted in each of two flats.

TABLE 2.—TABLE SHOWING THE EFFECT OF FREEZING BELLADONNA SEEDS UPON THE PERCENT OF GERMINATION.

		Percentage Germination.		
Flat No.	Treatment.	2 Weeks.	3 Weeks.	5 Weeks.
1	not frozen	3.7	7.6	10.4
2	not frozen	3.0	6.6	9.0
5	frozen	3.4	10.8	12.7
6	frozen	3.6	6.0	9.8

The above results demonstrate that freezing this particular sample of belladonna seeds did not appreciably benefit the extent of germination.

The effect of increasing the humidity and preventing excessive evaporation from the surface of the soil during the germination of belladonna seeds was determined.

The same methods as followed in the previous experiments were carried out, with the exception that two flats were covered tightly with glass plates, thus preventing excessive evaporation.

TABLE 3.—TABLE SHOWING THE EFFECT OF INCREASED HUMIDITY UPON THE GERMINATION OF BELLADONNA SEEDS.

		Percentage Germination.		
Flat No.	Treatment.	2 Weeks.	3 Weeks.	5 Weeks.
1	None	3.7	7.6	10.4
2	None	3.0	6.6	9.0
3	Increased Humidity	7.0	10.4	9.0
4	Increased Humidity	7.3	10.2	12.5

Increasing the humidity appreciably hastened the germination of belladonna seeds during the second and third weeks. At the five-week period, however, there was no appreciable increase. By increasing the humidity another factor presented itself, namely, that of "damping-off" fungi. This factor was responsible for the low results in flats Nos. 3 and 4 at five weeks.

All soils contain organisms and spores and cysts of many different kinds, some of which, when the conditions are favorable, become destructive to higher plants. An example of this kind was shown above in the case of the "damping off" fungi. By destroying these factors by sterilization a much more suitable medium is obtained.

To determine the effect of sterilization of a soil upon the extent of germination, a series of four flats of soil were prepared. Two of these flats of moistened soil were carefully wrapped with heavy Manila paper and sterilized in the autoclave at 15 lbs. pressure for $2^1/_2$ hours on two successive days. The four flats (two sterilized and two unsterilized) were planted with one thousand belladonna seeds. They were all covered with glass plates to prevent excessive evaporation. After three, four and five weeks, the number of seeds that had germinated was recorded.

TABLE 4.—TABLE SHOWING THE EFFECT OF STERILIZATION OF SOIL UPON THE EXTENT OF GERMINATION OF BELLADONNA SEEDS.

		Percentage Germination.		
Flat No.	Treatment.	3 Weeks.	4 Weeks.	5 Weeks.
1.....	No treatment	6.5	9.9	10.5
2.....	No treatment	2.5	3.5	3.5
3.....	Sterilized	15.2	16.7	17.3
4.....	Sterilized	22.0	37.6	41.6

The above data shows conclusively that sterilizing the soil was effective in producing a larger germination of belladonna seeds.

STUDY OF THE PLANTING OF BELLADONNA.

Practically all authorities on belladonna culture conclude that, to be successful with this crop, the seed should be planted in the hot house or cold frame, and when the plants have attained a sufficient growth they should be potted into small pots and grown under these conditions until they are transplanted into the field. It is essential to know just how long a period elapses from the time when the seed is planted until the plants are large enough to be transplanted into the field, as under practical conditions the seeds must be sown long enough in advance so that the plants will be sufficiently large when the field planting season begins. To determine the length of time from the period when belladonna seeds are planted until the plants are ready for potting each of eight flats of soil was planted with one thousand belladonna seeds. The development of the small plants was carefully noted and the results recorded. The germination, as before noted, was very irregular, many not having germinated eight weeks after planting. In this experiment almost all of the plants were large enough to pot five weeks after the seeds were planted. Fifty percent had the fifth leaf formed. Many plants were large enough to transplant (having four leaves formed) four weeks after the seeds were planted.

To determine the approximate length of time after the plants were potted until they were large enough for planting in the field, forty-five $1^1/_2$-inch pots were

filled with a light compost soil. Each pot was planted with a small belladonna plant, being careful that plants of about the same size were selected. Three months after potting, fifteen average sized plants were measured. The results were $4^3/_4$, 4, 4, 4, 5, 5, 5, 5, $3^1/_2$, $4^1/_2$, 5, 5, 5, 4 and $3^1/_2$ inches. The average height of these fifteen plants was $4^1/_2$ inches. It is apparent that three months after the small plants are potted they are large enough for transplanting into the field.

To ascertain to what extent added inorganic fertilizers hasten the growth of small belladonna plants when they are potted, at the same time that the above experiment was made, a series of pots having the same compost soil, with the addition of 3000 lbs. of sodium nitrate, 1200 lbs. of potassium sulphate and 2400 lbs. of calcium phosphate (mono-basic) per acre of 2,000,000 lbs., were planted. The measurements of fifteen average sized plants grown in the fertilized soil in three months were $7^1/_2$, 7, 7, 7, $6^3/_4$, $5^1/_2$, 6, 6, 8, $8^1/_4$, 8, 8, $7^1/_2$, $8^1/_2$, and $8^3/_4$ inches. The average height was $7^1/_4$ inches. Upon comparing the height of plants grown in fertilized and unfertilized soil ($7^1/_4$ vs. $4^1/_2$ inches), it is apparent that fertilization greatly stiumulated the growth.

EFFECT OF FERTILIZATION UPON THE GROWTH OF BELLADONNA PLANTS.

In the northern parts of the United States the growing season in the field is comparatively short, hence where it is possible to control them, the cultural conditions should be as near the optimum as possible in order to get the greatest yield. In the cultivation of belladonna to what extent is fertilization necessary? Schneider[10] states that the experiments with fertilizers were not successful, and that a fairly rich soil supplied with plenty of lime gave the best results. Carr[4] found that cultivated plants contained little more alkaloid than wild belladonna. He[2] states that fertilizers lower the alkaloid content, especially where nitrogenous manures are applied, this being due to the larger leaf growth. Carr[2] finds, further, that if the soil is not already rich, manure as well as complete fertilizers increase the yield considerably.

As it has been found that to secure a successful crop of belladonna, in almost all sections of the United States, it is essential that the seeds be germinated and the plants developed under glass, what fertilizers and in what amounts is it necessary to apply to secure the largest yields and best plants in the shortest time? For information on this point, the following experiment was made: About 350 lbs. of a light manure compost soil was divided into seven lots of 50 lbs. each. Fertilizer applications were made to the various lots as shown in the table below. Forty-five $1^3/_4$″ pots were filled from each lot of soil. The pots were then planted with small belladonna plants. In order that the experimental error should be small, plants of as nearly the same size as possible were planted. After these had grown for three months, ten average sized plants of each lot were carefully taken from the pots. The adhering soil was washed from the roots and the moisture dried off by means of filter paper. The plants were weighed and the results are presented on following page.

Studying the results presented in Table 5, it is apparent that large applications of inorganic fertilizers greatly increased the size and weight of belladonna plants, since two and a half times as much growth was realized in series No. 5 as in Series 7. Smaller amounts of fertilizer, namely, one-third as much as

TABLE 5.—TABLE SHOWING THE EFFECT OF FERTILIZERS UPON SMALL BELLADONNA PLANTS GROWN IN POTS.

Series No.	Fertilizer. Lbs. per Acre of 2,000,000 Lbs.	Weight of Plants. Gms.		Average. Gms.
1	1000 $NaNO_3$	3.8	3.0	
	400 K_2SO_4	2.3	3.7	
	800 $Ca(H_2PO_4)_22H_2O$	2.6	2.8	
	1000 $CaCO_3$	2.2	3.2	
		2.1	2.4	2.81
2	1000 $NaNO_3$	3.9	3.4	
	400 K_2SO_4	2.2	2.6	
		2.7	3.3	
	800 $Ca(H_2PO_4)_22H_2O$	2.7	2.7	
		1.5	3.2	2.82
3	400 K_2SO_4	2.1	1.7	
		2.2	1.7	
	800 $Ca(H_2PO_4)_22H_2O$	1.8	2.2	
		1.9	2.3	
	1000 $CaCO_3$	2.0	2.1	2.00
4	3000 $NaNO_3$	4.4	4.6	
	1200 K_2SO_4	4.7	5.0	
	2400 $Ca(H_2PO_4)_22H_2O$	4.7	4.7	
	3000 $CaCO_3$	4.8	4.1	
		5.5	4.0	4.65
5	3000 $NaNO_3$	4.9	5.6	
	1200 K_2SO_4	4.0	6.6	
		6.5	5.2	
	2400 $Ca(H_2PO_4)_22H_2O$	6.0	4.2	
		7.7	4.7	5.54
6	1200 K_2SO_4	1.1	1.5	
	2400 $Ca(H_2PO_4)_22H_2O$	1.6	2.1	
		2.0	1.3	
	3000 $CaCO_3$	1.6	1.3	
		1.8	1.7	1.60
7	No Fertilizer	2.7	1.8	
		1.8	1.9	
		2.3	1.6	
		1.4	1.7	
		1.5	2.8	2.05

the largest, did not materially increase the yields. That sodium nitrate was very essential for the maximum development of small belladonna plants is seen on comparing the results of Series 4 with 6. About one-third as much growth was realized in the determinations when sodium nitrate was not added. Comparing the results of Series 4 and 5, we note that calcium carbonate was not an important factor for the largest yield of these small plants, as there was a slightly larger amount of growth in the series where calcium carbonate was not applied.

To more fully determine the absolute fertilizer requirements of belladonna plants, an experiment was made in which sand instead of soil was used. Nine series of pots, using different combinations and amounts of fertilizers, were made. As in the above experiment there were forty-five $1^3/_4$-inch pots in each series. A small belladonna plant was planted in each pot, and after two and a half months

ten average size plants were selected. As before, these were washed and the moisture removed with filter paper.

TABLE 6.—SHOWING THE EFFECT OF INORGANIC SALTS UPON THE GROWTH OF BELLADONNA PLANTS WHEN GROWN IN SAND.

		Development of small plants.			Development of plants to maturity.		
Series No.	Fertilizer applications per acre of 2,000,000 lbs. Lbs. per acre.	Wt. of plants.		Average wt. of plants. Gms.	Pots No.	Wt. of plants. Gms.	Average weight. Gms.
					801	3.1	
21.....	776 $(NH_4)_2SO_4$	1.65	1.1				
	400 K_2SO_4	1.3	1.2	1.24	802	2.9	2.8
	800 $Ca(H_2PO_4)_2 2H_2O$	1.3	1.1				
	1000 $CaCO_3$	1.25	1.1		803	2.5	
		1.3	1.4				
22.....	1000 $NaNO_3$	1.4	1.2		804	2.4	
	400 K_2SO_4	1.2	1.1				
	800 $Ca(H_2PO_4)_2 2H_2O$	1.5	1.3	1.23	805	2.0	2.7
	1000 $CaCO_3$	1.2	1.1				
		1.2	1.1		806	3.7	
23.....	400 K_2SO_4	0.35	0.30		807	1.2	
	800 $Ca(H_2PO_4)_2 2H_2O$	0.33	0.35				
	1000 $CaCO_3$	0.35	0.30	0.32	808	1.9	1.3
		0.31	0.30				
		0.32	0.32		809	0.9	
24.....	1000 $NaNO_3$	3.3	2.1		810	4.2	
	400 K_2SO_4	3.15	2.2				
	800 $Ca(H_2PO_4)_2 2H_2O$	2.40	2.15	2.36	811	2.3	2.9
		2.7	1.9				
		1.9	1.8		812	2.4	
25.....	2328 $(NH_4)_2SO_4$	4.4	2.0		821		
	1200 K_2SO_4	4.2	2.4			4.9	
	2400 $Ca(H_2PO_4)_2 2H_2O$	3.3	1.3	2.58	822	4.1	4.5
	3000 $CaCO_3$	2.6	2.0				
		1.8	1.8		823		
26.....	3000 $NaNO_3$	2.7	1.7		824		
	1200 K_2SO_4	2.0	1.8			4.4	
	2400 $Ca(H_2PO_4)_2 2H_2O$	2.0	1.8	1.95	825	5.1	5.3
	3000 $CaCO_3$	1.8	2.1		826	6.5	
		2.0	1.6				
27.....	1200 K_2SO_4	0.40	0.40		827	1.7	
	2400 $Ca(H_2PO_4)_2 2H_2O$	0.40	0.38				
	3000 $CaCO_3$	0.42	0.39	0.39	828	1.2	1.5
		0.35	0.36				
		0.43	0.35		829	1.5	
28.....	3000 $NaNO_3$	4.4	1.9		830	3.4	
	1200 K_2SO_4	3.7	2.0				
	2400 $Ca(H_2PO_4)_2 2H_2O$	3.2	3.1	2.73	831	5.4	4.5
		2.7	1.9				
		2.0	2.4		832	4.7	
29.....	No Fertilizer	0.32	0.25		833	0.9	
		0.35	0.31				
		0.30	0.34	0.27	834	1.0	1.0
		0.20	0.21				
		0.23	0.24		835	1.1	

The effect of inorganic salts upon the growth of small belladonna plants is clearly demonstrated in the results presented above. In the determinations where a complete fertilizer was applied, as in Series 21, 22, 25 and 26, eight times as much growth was appreciated as was in the check (Series 29) where no fertilizers were added. Where complete fertilizers were applied, those receiving the largest applications made the largest yields. On comparing the results of Series 23 with 21 and 22, and 27 with 25 and 26, the importance of the nitrogen is appreciated, as only from one-fourth to one-sixth the growth was realized where no nitrogen was supplied. As in the previous experiments with soil, larger growths were realized where no calcium carbonate was applied than where it had been furnished.

To determine the effect of inorganic salts upon belladonna plants from the small plant stage to maturity, twenty-seven 6″ pots were filled with sand and to each series of three pots inorganic salts were added in amounts (per acre), and in the same proportion, as in the nine series of small pots above described. For instance, as seen in Table 6, pots Nos. 801, 802 and 803 received the same amount of fertilizer in proportion as the forty-five small pots of Series 21. Nos. 804, 805 and 806 received the same as No. 22, etc. Each of the pots Nos. 801, 802 and 803 were planted with one representative plant of Series 21. Likewise Nos. 804, 805 and 806 were planted with plants from Series 22, and so on throughout the series. The moisture condition of each of these pots was carefully maintained at the physical optimum of the sand. When the plants had reached the blossoming stage they were harvested and dried for 48 hours at 90° C. The weight of each individual plant is shown in Table 6, Part 2. In the last column of figures is the average weight of the three plants. Upon studying the results in Table 6, it will be seen that in practically all cases the fertilizers produced increases in yield with mature plants corresponding to those produced with small plants in the first stage of growth. Again in all cases where the largest applications of fertilizer were made the yields were largest. As before, one-fourth to one-half the yield was realized in the determinations receiving no nitrogen.

Since we had found the effect of inorganic salts upon the growth of belladonna plants in a light compost and also in sand, it was desired to find how much inorganic fertilizers influenced belladonna when applied to field soils. A large sample of clay loam soil was taken from a cultivated field on the premises of the Mulford Biological laboratories. Into each of twenty-one 6″ pots, 1,750 grammes of this soil was weighed. Fertilizer applications as shown in Table 7 were carefully made to each pot. The moisture conditions were made up to the physical optimum of the soil and maintained at this throughout the experiment by weighing the pots every day and restoring the loss due to evaporation and transpiration. Three small belladonna plants of the same size were planted in each pot. After they had grown for five weeks, two of the plants were pulled out. The remaining plants were allowed to grow until they had all reached the blossoming stage, when they were harvested and dried. The results are recorded on next page.

Inorganic fertilizers applied to this soil were effective in increasing the growth of belladonna. In every case where fertilizers were applied the yield was $2^1/_2$ to 3 times the growth of that in the control pots, where no fertilizers were applied. Comparing the results of pots Nos. 6, 7 and 8, with Nos. 31, 32 and 33, we found that where ammonium sulphate was the source of nitrogen, a slightly higher yield

TABLE 7.—TABLE SHOWING THE EFFECT OF INORGANIC FERTILIZER APPLIED TO A CLAY LOAM SOIL UPON THE GROWTH AND DEVELOPMENT OF BELLADONNA PLANTS.

Pot No.	Fertilizer Treatment. Lbs. per acre of 2,000,000 lbs.	Weight of stems and leaves. Gms.	Average. Gms.
1.....	No fertilizer	1.2	
2.....	No fertilizer	2.1	
3.....	No fertilizer	1.1	1.46
6.....	466 $(NH_4)_2SO_4$	3.8	
7.....	400 K_2SO_4	5.0	
8.....	800 $Ca(H_2PO_4)_2 2H_2O$		5.00
	1000 $CaCO_3$	6.3	
	100 $MgSO_4$		
	400 K_2SO_4	4.3	
11.....	800 $Ca(H_2PO_4)_2 2H_2O$	3.4	
12.....	1000 $CaCO_3$		3.80
13.....	100 $MgSO_4$	3.7	
	466 $(NH_4)_2SO_4$	3.8	
16.....	400 K_2SO_4	4.2	3.80
17.....	1000 $CaCO_3$	3.5	
18.....	100 $MgSO_4$		
	466 $(NH_4)_2SO_4$		
21.....	400 K_2SO_4	3.1	
22.....	800 $Ca(H_2PO_4)_2 2H_2O$	3.6	3.60
23.....	100 $MgSO_4$	4.3	
	466 $(NH_4)_2SO_4$	5.6	
26.....	800 $Ca(H_2PO_4)_2 2H_2O$	3.0	4.60
27.....	1000 $CaCO_3$	5.2	
28.....	100 $MgSO_4$		
	600 $NaNO_3$		
31.....	400 K_2SO_4	3.6	
32.....	800 $Ca(H_2PO_4)_2 2H_2O$	5.6	4.10
33.....	1000 $CaCO_3$	3.1	
	100 $MgSO_4$		

was realized than where sodium nitrate was employed. The results of pots Nos. 11, 12 and 13, 16, 17 and 18, and 21, 22 and 23, the series where nitrogen, phosphorus and lime were not supplied, respectively, were all about the same, namely, $2\frac{1}{2}$ times the results of the controls. These results show that there was a certain amount of available nitrogen, phosphorous and lime in this particular soil, and that while the plants did not make their maximum growth, they could utilize the other salts that were supplied.

EFFECT OF MOISTURE UPON THE GROWTH OF BELLADONNA PLANTS.

There is a very great difference in the amount of rainfall in various sections of the country and at different seasons. Likewise, in certain sections of the country irrigation is practiced, thus the moisture conditions can be controlled. Under controlled conditions, how much moisture do belladonna plants require? To gain some information upon the effect of conditions of moisture upon the growth and development of belladonna, the following experiment was made. Each of nine 6″ pots was filled with 1750 grammes of the same clay loam soil as was used in the above experiment. In order that the lack of fertilizers would not be a factor, a complete fertilizer, equivalent to 1000 lbs. of $CaCO_3$, 800 lbs. of $Ca(H_2PO_4)_2$-

$2H_2O$, 400 lbs. of K_2SO_4, 600 lbs. of $NaNO_3$ and 100 lbs. of $MgSO_4$, per acre of 2,000,000 lbs., was added to each pot. To one series of three pots distilled water was added so that the conditions of moisture were made up to the physical optimum of the soil. The moisture in the soil of the second series of three pots was made up to one-half the physical optimum and that of the third series was made to one and a half of the optimum. One small belladonna plant was planted in each of the nine pots. Plants of nearly the same size were planted. In all cases the moisture was maintained in the above-mentioned conditions by carefully weighing the pots every day and restoring the loss due to evaporation and transpiration. After the plants had grown for three and a half months they were harvested. The plant of each pot was cut off even with the surface of the soil, placed in a Manila bag and dried at 60° C. for four days. The roots were also carefully harvested, washed and dried.

TABLE 8.—TABLE SHOWING THE INFLUENCE OF MOISTURE UPON THE GROWTH OF BELLADONNA PLANTS GROWN IN A CLAY LOAM SOIL.

Pot No.	Moisture conditions.	Weight of leaves and stems. Gms.	Average. Gms.	Wt. of roots. Gms.	Average. Gms.
101	optimum	6.0		1.2	
102	optimum	6.5	6.5	1.4	1.6
103	optimum	6.9		2.2	
104	1/2 optimum	4.3		1.6	
105	1/2 optimum	4.0	4.1	1.0	1.4
106	1/2 optimum	4.0		1.6	
107	1 1/2 optimum	2.6		0.5	
108	1 1/2 optimum	1.1	1.9	0.2	0.33
109	1 1/2 optimum	2.2		0.3	

The results presented in Table 8 demonstrate conclusively that the moisture conditions of the soil in which belladonna grows is a very important factor in influencing the yield of belladonna leaves, stems and roots. In the pots where moisture to the extent of one-half the physical optimum of the soil was applied, two-thirds the weight of leaves and stems was realized compared with the pots where moisture was at the physical optimum, while, where one and a half times the optimum was applied, the growth was less than one-third of that where the optimum moisture was maintained. The root growth of the optimum and one-half optimum series was practically the same, while that of the one and a half optimum series was only one-fifth as large.

EFFECT OF SHADE UPON THE GROWTH AND DEVELOPMENT OF BELLADONNA PLANTS.

In the case of certain medicinal plants, shade is essential for growing a successful crop. Some investigators are of the opinion that belladonna plants require a certain amount of shade for maximum growths and yields. Gordon[5] states that belladonna plants did best when they were shaded part of the day. Carr,[3] testing the effect of various colors upon the yield and alkaloid content of belladonna, found that a green shade reduced the amount of inflorescence and at the same time increased the alkaloid content.

The effect of shade upon the growth and development of belladonna plants was determined. At the time the above experiment, testing the effect of mois-

ture on the growth of belladonna, was made, three additional 6″ pots were filled with soil. Fertilizers were added in the same amount as in the nine pots. The moisture was made up to the physical optimum, hence the conditions were identical with the optimal series of the moisture experiment, and that series served as a check for this shade experiment. After the pots were planted with the small plants, each of the three shade pots was covered with a frame 12 × 12 × 18 inches, which was covered with one thickness of the ordinary gauze cloth. These three pots received the same treatment as the optimal series of the moisture experiment, with the exception that they were shaded.

TABLE 9.—TABLE SHOWING THE EFFECTS OF SHADE UPON THE GROWTH AND DEVELOPMENT OF BELLADONNA PLANTS.

Pot No.	Treatment.	Weight of leaves and stems. Gms.	Average. Gms.	Wt. of roots. Gms.	Average. Gms.
101	Not shaded	6.0		1.2	
102	Not shaded	6.5	6.5	1.4	1.6
103	Not shaded	6.9		2.2	
201	Shaded	3.5		0.7	
202	Shaded	4.9	3.8	0.9	0.73
203	Shaded	3.0		0.6	

The effect of shade produced by the ordinary gauze cloth is readily seen by noting the results of Table 9. With all the conditions as to fertilizers, moisture, temperature and plants identical, shading the plants resulted in the production of about one-half of the yield of the unshaded series. From the practical standpoint, this is a very important factor. It is true, the alkaloid content of the shaded plants might have been higher than that in the unshaded series, as was found by Carr,[3] but in this case the alkaloid content of the shaded plant would have to be about twice that of the unshaded, to yield a like amount of alkaloid. Alkaloid determinations were not made on account of the small amounts of leaves and stems obtained.

STUDY OF THE MEANS OF COMBATING INSECTS ON BELLADONNA PLANTS.

Probably the greatest difficulty in the cultivation of belladonna is the control of this plant against the attacks of insects. Practically all of the chewing and sucking insects that are injurious to the various truck crops are destructive to belladonna. The most destructive insects, however, are the Colorado potato beetle and the green and pink aphids. To keep young plants free from insects, Borneman[1] recommends lemon oil and whale oil soap, while, as the plant becomes stronger, a weak solution of lead arsenate is recommended. To control the chewing insects, both Paris green and lead arsenate are recommended. As there was very little data available which showed carefully outlined experiments on the control of insects, several experiments were made. Twenty-four belladonna plants that were grown in the field, and that were badly infested with Colorado potato beetle, were selected for experimental purposes. Six plants were sprayed with Paris green 1 : 100, six with Paris green 1 : 50, a like number with lead arsenate 5 lbs. to 100 gallons of water, and the remainder left as controls. A week later they were again sprayed, and two weeks later a third time.

TABLE 10.—SHOWING THE CONTROL OF THE DESTRUCTIVE EFFECTS OF THE COLORADO POTATO BEETLE ON BELLADONNA PLANTS BY MEANS OF VARIOUS SPRAYS.

	Treatment.	Effect of spray on insects.	Effect of spray on plant.	Effect of Insect on plants.
1.	No treatment	..	..	plant destroyed
2.	Paris green 1 : 100	destroyed	no injury	no injury
3.	Paris green 1 : 50	destroyed	badly injured	no injury
4.	Lead arsenate	destroyed	no injury	no injury

The results of the experiment given above demonstrate that belladonna plants cannot withstand the attack of potato beetles if they are not suitably protected by means of some poison. Both Paris green, of a concentration of 1 pound to 100 gallons of water, and lead arsenate 5 pounds to 100 gallons, proved effective in controlling the attacks of this insect. No spray injury was perceptible on the plants where these sprays were applied. Paris green, 1 pound to 50 gallons of water, proved too concentrated for belladonna plants, as all the plants which were sprayed with this solution were destroyed by the effects of the spray.

For controlling various aphids on the belladonna plants, several combinations of soap and kerosene and soap and tobacco extract were tried. The results with the first mixture (soap and kerosene) were unsatisfactory. Soap and tobacco combinations were only partially successful. The principal difficulty experienced in the latter case was controlling the concentration of the extract of tobacco.

Experiments using "nicotine sulphate" (Black Leaf 40) with soap proved very satisfactory in controlling the various forms of aphids. A field experiment was performed, in which case a series of 12 plants were sprayed with a nicotine soap solution made in the proportion of 4 pounds of soap, 1/2 pint "nicotine sulphate" (Black Leaf 40) and 100 gallons of water; a second series of 12 plants with 4 pounds soap and 3/4 pint of "nicotine sulphate;" a third series with 4 pounds of soap and 1 pint of "nicotine sulphate" to 100 gallons of water. A series of 12 plants were reserved as checks, receiving no spray treatment.

TABLE 11.—TABLE SHOWING THE CONTROL OF APHIDS ON BELLADONNA PLANTS.

Series No.	Treatment.	Effect on Insects.	Effect on plants.
1.	Soap + 1/2 pt. "nicotine sulphate"	aphids 75% destroyed	no effect
2.	Soap + 3/4 pt. "nicotine sulphate"	aphids 100% destroyed	no effect
3.	Soap + 1 pt. "nicotine sulphate"	aphids 100% destroyed	very slight injury
4.	No treatment		All plants badly damaged by aphids

The results of this experiment show conclusively that "nicotine sulphate" (Black Leaf 40) in combination with soap is very effective in destroying aphids on belladonna. "Nicotine sulphate" 1/2 pint in combination with the soap was not as effective in controlling the aphids as the solution made with either the 3/4 pt. or the 1 pint per 100 gallon. The latter solution, while very effective in destroying the aphids, produced slight spray injury.

STUDY OF THE EFFECT OF DRYING BELLADONNA LEAVES AT DIFFERENT TEMPERATURES UPON THE ALKALOID CONTENT.

Drying medicinal plants is a step in the practical phase of drug culture that requires a certain amount of consideration. No definite temperature at which this plant should be dried has been adopted. Sievers[12] after air drying his samples,

dried them to constant weight in a hot air oven at a maximum temperature of 60° C. Roberts[9] reports results of experiments on drying fresh belladonna leaves, which show loss of 60% on drying in vacuum at 45° C.

To determine to what extent drying at various temperatures, and heating first and then drying, influences the alkaloid content of belladonna leaves and the color of the final product, an experiment covering this phase of the work was made.

A large sample of about 2000 Gm. of belladonna leaves was collected. In order to reduce the possibilities of errors incurred in sampling, these leaves were cut into small pieces. After this mass of small particles of leaves was very carefully mixed it was divided into five samples of about 400 Gm. each. One sample was dried under natural conditions in the greenhouse, at a temperature of 30° C.; one sample was dried in a large incubator where the temperature was maintained at 55–60° C. Another was dried at 100°C., a fourth sample was heated to 100°C., and then the drying completed at 55 to 60°C., and the other was placed in an autoclave, which was maintained at 15 lbs. pressure for 1½ hours. It was then dried at 55–60° C. The samples, when thoroughly dry, were submitted for analysis. The results were as follows:

TABLE 12.—TABLE SHOWING THE EFFECT OF DRYING AT VARIOUS TEMPERATURES UPON THE ALKALOID CONTENT AND CHARACTER OF BELLADONNA LEAVES.

Sample No.	Treatment.	Mydriatic Alkaloid.	Color of leaves.
401.....	Dried in greenhouse at 30° C.	0.327	fine green
402.....	Dried at 55–60° C.	0.345	green
403.....	Dried at 100° C.	0.369	brown
404.....	Heated to 100° C. then dried at 55–60° C.	0.366	brown
405.....	Autoclaved, then dried at 55–60° C.	0.264	brown

The results presented above show that the temperature at which belladonna leaves are dried is a very important factor. The samples dried at 55–60° C., 100° C. and heated to 100° C., then dried at 55–60° C., showed a slightly higher percent of mydriatic alkaloid than the sample dried at 30° C. When a higher temperature than 30° C. was employed, the fine green color of the leaves was somewhat lost. The sample dried at 55–60° C. was still green, but those dried at a temperature above this or heated at 100° C., or in the autoclave and then dried at 55–60° C., were of an undesirable brown color. By heating in the autoclave and then drying at 55–60° C., 20 percent of the total mydriatic alkaloid content was lost. From these results we would conclude that when artificial heat is employed in drying leaves of belladonna, it is not advisable to employ a temperature higher than 55–60° C.

STUDY OF THE PRODUCTION OF SEEDS BY BELLADONNA PLANTS.

One of the principal reasons for the lack of advance in cultivation of belladonna in the United States is because of the difficulty in securing good viable seed. Up to 1914 most of the belladonna seeds were obtained from abroad. Since that time individuals interested and engaged in the cultivation of belladonna have learned how to harvest their own seed.

Belladonna plants are very prolific seed producers, each plant yielding a very large number of seeds. As it was desirable to know how much seed belladonna plants produced, the seed from each of sixteen plants was collected at the time when

most of the seed-pods were black. The following are the weights in grammes of seeds harvested from the sixteen plants: 65.0, 32.0, 21.0, 20.0, 27.0, 18.0, 63.5, 28.5, 18.5, 9.0, 9.5, 29.7, 27.2, 26.2, 39.0, and 15.5. The average of these sixteen weights was 28.1 grammes. Under field conditions twenty-two pounds of good viable seeds of belladonna were harvested from one-tenth of an acre. Formerly when seeds were collected from belladonna plants, it was the custom not to molest the plant and utilize no portion of it other than the seeds. It has been found here, with belladonna plants, that if they are planted sufficiently early in the season, and the first growth of leaves harvested, a larger number of leaves and seed-pods will form than if the first crop of leaves is not picked. The above reported figures represent seed taken from plants, the first crop of leaves of which had been harvested.

INFLUENCE OF THE PRESENCE OF STEMS UPON THE ALKALOID CONTENT OF BELLADONNA LEAVES.

It is usually the custom to utilize only the leaves of the belladonna plants, as it is generally considered that the alkaloid content of the stems would be far below the U. S. Pharmacopoeia requirement. It has been previously shown by the writer[7] in the case of stramonium that the stems can be used in conjunction with the leaves in the proportion in which they exist at harvesting time and the U. S. P. requirements still met. Similarly the writer[8] has demonstrated the fact that stems and roots of hyoscyamus collected after harvesting the seed contain a relatively high percentage of alkaloid. As was stated before,[7] if we can utilize the stems it will greatly reduce the cost of harvesting.

To secure information on the extent to which the presence of stems of belladonna influences the total alkaloid content of leaves, six representative belladonna plants were harvested. The leaves, stems and roots of each plant were separated, placed in separate Manila paper bags, and dried in the oven for four days at 55 to 60° C.

TABLE 14.—TABLE SHOWING THE PROPORTION OF STEMS TO LEAVES IN BELLADONNA PLANTS.

Plant No.	Part of plant.	Wt. of Material. Gms.	Proportion of leaves to stems. Percent.
1	Leaves	88.8	68.3
1	Stems	41.1	31.7
2	Leaves	47.8	65.8
2	Stems	24.8	34.2
3	Leaves	71.8	66.7
3	Stems	35.8	33.3
4	Leaves	49.8	65.0
4	Stems	26.8	35.0
5	Leaves	50.4	66.6
5	Stems	25.3	33.4
6	Leaves	63.8	63.6
6	Stems	36.5	36.4

The results with six plants, as presented in Table 14, show that under the ordinary field conditions the proportion of leaves to stems of belladonna is as 2 to 1.

To determine the effect of the presence of stems upon the total alkaloid content of belladonna, samples of the unground parts of the plants were made up

as shown in the following table. After each sample was ground and carefully mixed, mydriatic alkaloid determinations were made.

TABLE 15.—TABLE SHOWING THE EFFECT OF THE PRESENCE OF STEMS UPON THE TOTAL ALKALOID CONTENT OF BELLADONNA.

Sample No.	Kind of material.	Mydriatic alkaloids.
1	Leaves of plants Nos. 1 and 2	0.466
2	Leaves of plants Nos. 3 and 4	0.488
3	Leaves of plants Nos. 5 and 6	0.434
4	Leaves of plants Nos. 1 and 2 + 10% Stems of plants Nos. 1 and 2	0.508
5	Leaves of plants Nos. 3 and 4 + 10% Stems of plants Nos. 3 and 4	0.513
6	Leaves of plants Nos. 5 and 6 + 10% Stems of plants Nos. 5 and 6	0.459
7	Leaves of plants Nos. 1 and 2 + Stems of plants Nos. 1 and 2 in prop. 67.4 : 32.4	0.600
8	Leaves of plants Nos. 3 and 4 + Stems of plants Nos. 3 and 4 in prop. 66.0 : 34.0	0.508
9	Leaves of plants Nos. 5 and 6 + Stems of plants Nos. 5 and 6 in prop. 64.9 : 35.1	0.479
10	Stems of plants Nos. 1 and 2	0.334
11	Stems of plants Nos. 3 and 4	0.291
12	Stems of plants Nos. 5 and 6	0.216

The results of the above experiment demonstrate the fact that all parts of these belladonna plants showed a high content of mydriatic alkaloid. The alkaloid determination of the stems in but one case showed a content of an appreciable amount below the U. S. P. requirement of 0.30 percent. It is seen that the results of samples Nos. 4, 5 and 6, which were made allowing the presence of the maximum amounts of stems which the U. S. P. requirement ordinarily permits (that is, if stems are considered as foreign matter), and Nos. 7, 8 and 9, in which cases there was 33% stems used, run as high or higher in mydriatic alkaloid than did the samples of leaves Nos. 1, 2 and 3. Theoretically it would seem that Samples 7, 8 and 9 should be considerably lower in alkaloid content than Nos. 1, 2 and 3, due to the presence of the stems, but practically, on taking samples for analysis, deviations of this kind would enter into such determinations, because of taking unground parts of the plants, conforming as nearly as possible to the practical condition. The results with these plants show conclusively that the stems can be harvested and used in conjunction directly with the leaves as they exist in the field without danger of the final product falling below the U. S. P. requirement.

SUMMARY.

The following is a brief summary of the results of experiments carried out in this work.

1. Under ordinary conditions, using good viable belladonna seeds in soil, about 7 percent will germinate in three weeks and 10 percent in five weeks.

2. Freezing belladonna seed at —12° C. for six hours does not appreciably hasten or increase the germination in soil.

3. Increasing the humidity of soil increased the germination of belladonna seed about 4 percent in 2 and 3 weeks, but it encouraged the development of "damping off" fungi in unsterilized soil.

4. Sterilizing the soil in the autoclave encouraged the germination of about twice the ordinary number of belladonna seeds and prevented the destructive effects of the "damping off" fungi.

5. Most of the plants resulting from the seeds which germinated in the first three weeks after the seed is planted will have reached a large enough height to transplant into small pots in five weeks.

6. When using ordinary compost soil, to which no inorganic salts are added, three months after potting the plants will be large enough to transplant into the field. When inorganic salts, such as $NaNO_3$, K_2SO_4 and $Ca(H_2PO_4)_22H_2O$ are added to the same compost soils, it will not be necessary to grow them in the pots for as long a period as three months before planting in the field.

7. In forcing small belladonna plants, when growing them in the small pots, to secure suitable plants for the field, applying a combination of 3000 pounds $NaNO_3$, 1200 pounds K_2SO_4 and 2400 pounds $Ca(H_2PO_4)_22H_2O$ on an acre basis of 2,000,000 pounds, gave the best results in cases where a clay-loam compost was used and also where sand was employed.

8. Growing belladonna in sand to which no nitrogen fertilizers were supplied resulted in one-half to one-third the yield which was obtained when nitrogen was supplied. There was little difference between the growth of belladonna when nitrogen was applied in the form of $NaNO_3$ or $(NH_4)_2SO_4$.

9. The application of $CaCO_3$ did not seem to be an effective factor in increasing the growth of the belladonna plant in sand.

10. Applying inorganic fertilizers to a clay loam soil was very effective in producing increased yield. Where the complete fertilizer was added there was $3^1/_2$ times as much growth as where no fertilizers were applied.

11. Two-thirds as much weight, of leaves and stems, was harvested where moisture to the extent of one-half the physical optimum of the soil was applied as was produced where the conditions of moisture were at the optimum. Applying moisture of $1^1/_2$ times the optimum produced less than one-third of the growth where the optimum was employed.

12. Shading belladonna plants with gauze resulted in the growth of about one-half as much weight of leaves, stems and roots as was obtained in unshaded plants.

13. Colorado potato beetles were controlled on belladonna plants by applying Paris green 1 : 100, or lead arsenate 5 pounds to 100 gallons and no spray injury was realized.

14. "Nicotine sulphate" (Black Leaf 40), $^3/_4$ pint in addition to 4 pounds of soap per 100 gallons of water was effective in destroying and controlling aphids on belladonna.

15. To secure the most desirable product, leaves of belladonna should not be dried at a temperature higher than 55–60° C.

16. An ordinary belladonna plant will easily yield 28.0 Gm. (approximately 1 ounce) of viable seed, if collected at the proper time.

17. Under field conditions the proportion of leaves to stems of belladonna is about 2 : 1.

18. Alkaloid determinations of samples of belladonna made with 90 percent leaves and 10 percent stems, which is the largest amount of stems that the U. S. P. permits, were not any lower in mydriatic alkaloid than samples of leaves. Likewise, samples containing $33^1/_3$ percent stems and $66^2/_3$ percent leaves were no lower in alkaloid than the samples made of leaves.

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SUBJECTS.

Study of the Germination of Belladonna Seeds.
Study of the Planting of Belladonna.
Effect of Fertilization upon the Growth of Belladonna Plants.
Effect of Moisture upon the Growth of Belladonna Plants.
Effect of Shade upon the Growth and Development of Belladonna Plants.
Study of the Means of Combating Insects on Belladonna Plants.
Study of the Effect of Drying Belladonna Leaves at Different Temperatures upon the Alkaloid Content.
Study of the Production of Seeds by Belladonna Plants.
Influence of the Presence of Stems upon the Alkaloid Content of Belladonna Leaves.
Summary.
Bibliography.

A STUDY OF VARIOUS PNEUMOCOCCIDAL SOLUTIONS FOR MOUTH WASHES.*

BY S. SOLIS COHEN, M.D., AND EDWARD STEINFIELD, M.D.

Dochez and Avery,[1] Stillman[2] and Sydenstricker and Sutton[3] have demonstrated that infection in pneumonia occurs by way of the upper respiratory tract, through contact with pneumonia patients, convalescents or carriers, harboring virulent fixed strains of pneumococci in the mouth.

At the request of one of us (S. S. C.) Kolmer and Steinfield[4] investigated the use of specific pneumococcidal substances such as ethylhydrocuprein hydrochloride, quinine and urea hydrochloride, quinine bisulphate and other cinchonics incorporated in a mouth wash. They found that ethylhydrocuprein was effective as a pneumococcicide in solution so dilute as 1 : 160,000, and the quinine salts in solutions of about 1 : 20,000. The strongest solution they could induce patients to use was 1 : 10,000. They recommend, accordingly, the use of quinine hydrochloride 1 : 10,000 in the "Liquor Thymolis" of the House Pharmacopoeia of the Philadelphia Polyclinic, as a means of diminishing the chances of infection in nurses and physicians and minimizing the dangers of spread by carriers. In their experiments, however, this solution could not keep the mouth and throat secretions continuously sterile.

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* From the Clinical Laboratories of the Jewish Hospital, Philadelphia.

It seemed probable that the use of the cinchonics in greater concentration might prove more uniformly effective under varied conditions; but to make this practicable the solutions must be rendered palatable, or, at least, not unpalatable.

To test this, a number of solutions were made up for us by Professor E. Fullerton Cook, with various flavoring vehicles. They contained quinine and urea hydrochloride—chosen because of its high solubility—in various strengths up to as high as $^1/_2$ and 1 percent, in which it develops anesthetic power. Some contained phenol in addition to the quinine. Honey, syrup, glycerin or acacia was used to give the mixture an adhesive quality that would retain it in contact with the mucous membranes for some time after rinsing or gargling.

These mixtures were tested by cultural methods both upon pure cultures of Type I, II and III pneumococcus, and upon sputum containing virulent pneumococci.

The method of study was as follows:

In a series of sterile test-tubes were placed 0.5 Cc. of a cinchonic solution and 0.5 Cc. of a suitable dilution of pneumococcus culture (usually 1 : 2) or 0.5 of sputum of a pneumonia patient. These were mixed and incubated at 37.5° C. for one-half hour. At the expiration of this period a platinum loopful from each tube was plated into 10 Cc. of glucose agar or blood agar. The virulence of the cultures used was such that 0.000001 Cc. was fatal to white mice in from 24 to 48 hours after intraperitoneal injection.

Two points were to be determined: 1. Do the vehicles used for palatability interfere with the quinine action? 2. Do these vehicles enhance the effect—in other words, have they germicidal qualities of their own?

In the tables giving the results of the experiments the various solutions are represented by the numerals which designate them in the following list (with brief parenthetic memoranda):

FORMULAS OF SOLUTIONS USED.

No. 1.

Vehicle Control—5% Infusion of Coca.

No. 2.

Quinine and Urea Hydrochloride	1
Infusion of Coca	100

No. 3.

COMPOUND GARGLE OF GUAIAC (N. F.).

Ammoniated Tincture of Guaiac	100
Compound Tincture of Cinchona	100
Clarified Honey	200
Potassium Chlorate	40
Oil of Peppermint	2
Water to make	1000

No. 4.

Compound Gargle of Guaiac with Coca—
Replace water of N. F. with 5% Infusion of Coca.

No. 5.

Quinine and Urea Hydrochloride	1
Compound Gargle of Guaiac to make	1000

No. 6.

Quinine and Urea Hydrochloride	1
Compound Gargle of Guaiac to make	100

No. 7.

Quinine and Urea Hydrochloride	1
Acacia	10
Compound Gargle of Guaiac to make	100

No. 8.

Quinine and Urea Hydrochloride	1
Acacia	5
Compound Gargle of Guaiac to make	100

No. 9.

Compound Gargle of Guaiac, with substitution of Quinine and Urea Hydrochloride	10
Water to make	100

—for the 100 mils of Compound Tincture of Cinchona

No. 10.

Quinine and Urea Hydrochloride	0.5
Phenol	0.5
Glycerin	20.0
Oil of Peppermint	2 drops
Water to make	100.0

No. 11.

Quinine and Urea Hydrochloride	1
Phenol	1
Acacia	1
Compound Gargle of Guaiac	100

No. 12.

Quinine and Urea Hydrochloride	0.5
Phenol	0.5
Syrup of Tolu	20.0
Water to make	100.0

No. 13.

Quinine and Urea Hydrochloride	1
Phenol	1
Oil of Peppermint	2 drops
Water	100

No. 14.

Quinine Phenolate	1
Menthol	1
Expressed Oil of Almond	100

No. 15.

Phenol 1%. (Control.)

No. 16.

Quinine and Urea Hydrochloride 1%. (Control.)

TABLE I.—RESULTS OF BACTERICIDAL TESTS UPON TYPES I AND II PNEUMOCOCCUS CULTURES AND UPON SPUTUM OF A TYPE II PNEUMONIA.

No.	Formula.	—Colonies per Plate after 48 hours.— Cultures. Type I.	Cultures. Type II.	Sputum. Type II.
1.	Infusion Coca	810	480	3,660
2.	Infusion Coca with 1 percent Quinine and Urea Hydrochloride	3	5	10
3.	Compound Gargle of Guaiac	17	25	182
4.	Compound Gargle of Guaiac with Infusion of Coca	21	71	1,260
5.	Compound Gargle of Guaiac with 0.1 percent Quinine and Urea Hydrochloride	22	9	31
6.	Compound Gargle of Guaiac with 1 percent Quinine and Urea Hydrochloride	3	Sterile	Sterile
7.	Same as No. 6 with 10 percent Acacia	16	51	720
8.	Same as No. 6 with 5 percent Acacia	8	81	8
9.	Compound Gargle of Guaiac with 1 percent Quinine and Urea Hydrochloride—Replacing Compound Tincture of Cinchona	Sterile	Sterile	Sterile
10.	Quinine and Urea Hydrochloride and Phenol each 1/2 percent, Glycerin, Oil of Peppermint and Water	Sterile	Sterile	Sterile
11.	Acacia, Phenol and Quinine and Urea Hydrochloride each 1 percent in Compound Gargle of Guaiac	Sterile	Sterile	Sterile
12.	Phenol and Quinine and Urea Hydrochloride each 1/2 percent in Syrup of Tolu and Water	Sterile	Sterile	Sterile
13.	Phenol and Quinine and Urea Hydrochloride each 1 percent in Peppermint Water	Sterile	Sterile	Sterile
14.	Quinine phenolate and Menthol each 1 percent in Expressed Oil of Almond	Sterile	Sterile	Sterile
15.	Phenol 1 percent	Sterile	Sterile	Sterile
16.	Quinine and Urea Hydrochloride 1 percent	Sterile	Sterile	Sterile
	Control (Sputum and Salt Solution)	1,150	540	4,860

The results as indicated in Table 1 showed but little interference of the vehicles with the germicidal action of the quinine except in those solutions containing acacia. In such solutions a constant and definite lessening of activity was ob-

served, which may possibly be due to a mechanical action. Mixtures made with Infusion of Coca are more palatable than those made with plain water, but show slightly lessened germicidal power and some precipitation of the quinine. Solution No. 10 (phenol, quinine and urea hydrochloride, glycerin, oil of peppermint and water) was chosen as being on the whole most palatable of those made without coca. This solution with other controls was therefore used against Type III pneumococci. The results of these tests are shown in Table 2.

TABLE 2.—RESULTS OF BACTERICIDAL TESTS UPON TYPE III PNEUMOCOCCI,—WITH SOLUTION NO. 10 AND VARIOUS COMPARISONS.

Solution.	Colonies per plate after 48 hours.
10	Sterile
Quinine Hydrobromide 1 : 200	Sterile
Quinine Bisulphate 1 : 200	Sterile
Ethylhydrocuprein Hydrochloride 1 : 200	Sterile
Control	6,280

The results recorded in Table 2 showed that the same activity was noted against Type III as against the other types.

SUMMARY.

These experiments show that cinchonic solutions of high concentration may be made up with various vehicles of even thick consistency without materially altering the bactericidal power. The solution marked No. 10 is, however, water clear with no tendency to produce precipitates or sediments. Phenol has been included as a good reinforcing agent and suitable for its effects upon other pathogenic organisms such as streptococci. This is desirable in view of recent observations upon atypical pneumonias believed by Cole and McCallum[5] to be due to hemolytic streptococci invading respiratory tracts of susceptible individuals such as patients suffering from measles.

CONCLUSIONS.

1. A number of quinine solutions in different flavoring vehicles have been made up with the purpose of determining palatability and germicidal activity against pneumococci.

2. These solutions have all been found capable of destroying pneumococci of Types I and II *in vitro*. Those containing acacia have been less efficacious than others. Neither glycerin, syrup nor honey seems to interfere materially with the action of the germicide.

3. A solution containing quinine and urea hydrochloride and phenol, each in a dilution of 1 : 200, made up with 20 percent of glycerin and flavored with oil of peppermint, is fairly palatable. This was tested against Type III pneumococci also and found effective. It exhibits, likewise, penetrative ability in sputum.

4. The solution mentioned in paragraph 3 may readily be associated with the compound guaiac gargle which has been found so effective against tonsillitis and other throat infections, and which of itself shows considerable germicidal ac-

tivity against pneumococci. To do this one simply substitutes compound gargle of guaiac (N. F.) for the water of formula No. 10.*

5. Infusion of coca may be substituted for water in all the formulas with advantage as to palatability, but owing to the tannin it contains, it precipitates some of the quinine. This may, perhaps, lessen slightly the germicidal activity, but it has been shown elsewhere[6] that even insoluble quinine tannate in small proportions will inhibit the growth of pneumococci in test-tube cultures.

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A PLEA FOR A CLOSER STUDY OF PHARMACEUTICAL PREPARATIONS IN THE LIGHT OF THE CRITICISMS OF THE MEDICAL PROFESSION.†

BY L. E. SAYRE.

In the Epitome of the U. S. P. and N. F., published by the American Medical Association, these words occur in the introduction: "Both the Pharmacopoeia and the National Formulary include many drugs and preparations which are irrational, superfluous or worthless."

As these works are supposed to be largely the creation of the medical and pharmaceutical professions it has occurred to the writer that special coöperative effort might lead to some constructive scheme of elimination and possibly to a better feeling and understanding as to: Where lies the responsibility for these drugs and preparations—who stands sponsor for them and why? As it is, a small, uninformed number of the medical profession believes that pharmacists are responsible for the so-called irrational preparations, and some members of the pharmaceutical profession believe that they were brought into existence principally by physicians. Neither view is tenable. As a member of the Committee on Miscellaneous Formulae I have never considered it my province to pass judgment on the therapeutical merit of any preparation, but to prepare a pharmaceutical product of the indicated ingredients. The same attitude has been taken with formulas sent to the laboratory by individual physicians, merely extracting the

* Clinically I have obtained excellent results by simply adding phenol, menthol, and quinine and urea hydrochloride, each one grain to the fluidounce (1 : 500) and glycerin one fluidrachm to the fluidounce (1 : 8) to the guaiac gargle. This, however, can be bettered by getting rid of the tannin, which tends to precipitate some of the quinine. As a general disinfectant for all pathogenic organisms the addition of formaldehyde solution, 1 drop to the ounce, improves it further and the taste is not made worse.—S. S. C.

† Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Chicago meeting, 1918.

drugs indicated in the formula and blending them into an acceptable preparation. Not long ago such a formula (of ten ingredients) was received; many of the ingredients would have, perhaps, been considered as superfluous. It would have been discourteous, to say the least, to pronounce upon the therapeutic status of the finished product. Pharmaceutical manufacturers frequently receive private formulas of the same character, such as would not pass censorship, but they likewise do not pass upon their clinical value—whether certain ingredients are superfluous, irrational or useless.

We have had some able and constructive criticisms of existing pharmaceuticals by eminent physicians and some very caustic ones by medical critics.

Dr. H. C. Wood's able criticisms were published in the *American Journal of Pharmacy* a few months ago; in the *Journal of the American Medical Association* for March, 1918, a rather caustic one appeared, Quoting the author of the latter: "It is safe to say that there is not a physician in one of the Army posts, who, if the question were put to him frankly, would admit that the Compound Syrup of Hypophosphites belonged to the armamentarium of a scientific physician, yet 6000 pounds of this relic of the past generation are called for, are to be paid for and are to occupy valuable freight space in shipping to the various Army posts. What utter waste! and what a reflection!" This caused me to refer to the Epitome. On page 49 it states: "This preparation is an antiquated, complex and irrational tonic." It has taken many years since Churchill's time to find this preparation so valueless that its shipping needlessly occupies valuable freight space. Who is party to the crime for its existence?

As a member of the pharmaceutical profession I have always held that the pharmacist, through his experience, his training, his contact with physicians and his access to medical literature, was not incapable of judging as to what is irrational and useless. It may be said in passing that one of our eminent pharmacists is director of the chemical laboratory of the American Medical Association and many of our State pharmaceutical chemists have assisted him in the work of eliminating misbranded and worthless material.

However, neither the pharmacist nor the physician can wholly regulate what physicians may employ in their practice. I told a medical friend that pharmacological investigation seemed to show that tincture of cactus had no virtue as a cardiac tonic; he replied "to accept such a statement would drive me to drink." Another medical friend was told that Echinacea was not regarded as a valuable drug by the American Medical Association; he replied: "I am only sorry for the association." Whether it is scientific or not, physicians as a rule will use drugs and preparations in which their clinical experience has led them to have confidence. The practice of medicine, they say, is not all theory. The pharmacist's attitude is a neutral one by virtue of his position. He supplies what is demanded and, if he uses his business and pharmaceutical skill, will create and improve preparations to meet his patrons' wants. He will promote his branch of medicine to the extent of his business and scientific ability. He risks the fate of his efforts which he knows may be unremunerative and unappreciated. His products may be even regarded as unworthy of freight space. As pharmacists we are obliged to face the fact that, as medical science progresses, new points of view arise and agents which to-day are scientific and rational may to-morrow be relegated to the

scrap pile, by medical authority. Still, if the demand keeps up, the medical profession should not unwillingly bear part of the responsibility of their continuance. Physicians continue to prescribe Syrup of Sarsaparilla Compound (denounced as irrational, etc.) as a vehicle. Compound Syrup of Hypophosphites—a physician said to me only recently, "It is absurd to denounce this preparation."

In order that a better feeling may prevail regarding the continuance of these so-called unworthy remedial agents and promote their replacement or elimination, would it not be a wise move for this Section to consider a plan of coöperation leading to a closer scrutiny and oversight of questionable agents and preparations, helpful to physicians and pharmacists alike? Incidentally it might remove, to some extent, the prejudice referred to, which retards or restrains efficient coöperative work and coördination.

The American Medical Association has opened the way and made progress in the direction indicated, having pronounced its own point of view, which should be duly recognized. It is natural that the point of view of the American Pharmaceutical Association differs from that of the former association, and the pharmacists' views should be respectfully considered.

If the plan suggested would more rapidly bring about coördination in necessary reforms and elimination of useless or needless materia medica, it certainly would be worth while. I realize that in making this suggestion I am only emphasizing what has been said before, in another form, by others of this Association. One of the results of this coöperation would, I feel sure, be to promulgate the idea which the Pharmacopoeia expresses: Because certain drugs and preparations are admitted into our standard works, they are not thereby necessarily recommended therapeutically. We should understand that the admission of an article does not imply a recommendation. But its recognition means a frequently used or prescribed drug or preparation, and, as far as possible, a standard has been supplied so that a uniform product is made available.

Clinical Evidence: Rule 5 of the Council on Pharmacy and Chemistry of the A. M. A. states: "To be acceptable, the clinical evidence must offer objective data with such citation of authority as will enable the Council to confirm the facts and establish the scientific value of the conclusions drawn, etc. This rule would be helpful in the coöperative work.

As to unscientific and useless articles, Rule 10 of the Council should be expanded and made more definite. A basis might be discovered whereby one could more definitely determine whether an article or preparation is unscientific or useless.

Rule 10 reads as follows: The use of articles which are unessential modifications of official or established non-proprietary articles is unscientific and serves no useful purpose. * * * * *. This class includes mixtures containing an excessive number of ingredients; those which contain substances of no probable therapeutic assistance to each other; those of no therapeutic value. The combination of two or more remedies in a mixture must be considered contrary to scientific medicine unless a distinct reason exists for such a combination, etc.

In closing let me restate what was said in the beginning of this paper: Cooperative work of this Section with representative members of the medical profession would be productive of better feeling, would lead to a mutual under-

standing relative to the drugs and preparations complained of, and be helpful in their elimination, when desired. The result of the efforts in this special direction would also aid the revisers of the United States Pharmacopoeia and National Formulary.

DISCUSSION.

THE CHAIRMAN: I think that all of us, who are closely associated with the practice of pharmacy, realize that if physicians would tell us just what they want in scientific compounds they would relieve us of a great deal of responsibility in the matter of preparing remedies. It is to be regretted that we have so many unscientific compounds, but they exist because there is a demand for them, and unfortunately these are multiplied by others. The success of one proprietary is considered sufficient reason for trying to make another even more successful. Cooperation of physicians and pharmacists as outlined by Professor Sayre would, no doubt, accomplish a great deal of good.

BERNARD FANTUS: This is certainly one of the constructive moves that I believe should be made. It is only to be hoped that the physicians will meet the pharmacists as they ought to. You know doctors have quite a way of being autocrats in the sick-room, and they get to feel that they have a right to be autocratic in all respects, and many of us here, I suppose, including myself, are opinionated. The fact Hippocrates discovered and published, that experience is fallacious and judgment difficult, is so true of medical practice that the opinion of any one physician or any number of us, on such questions as the desirability of certain preparations, should not be regarded altogether too seriously. I am convinced that pharmacists could be of great help to physicians in their learning about the value of preparations. I believe that humanity is not so foolish as to use a certain material indefinitely unless there is some good in it. I am, perhaps, not a fit person to discuss the other view that has the upper hand with our medical editors, namely, the conservative view, as they see it. The trouble with our materia medica has been that nearly everything has been recommended for nearly everything. The scientific physician was, in the past, so helpless in handling this enormous mass of handed down material that he wanted to start with a clean slate. Let us remind you that five thousand remedies were at one time carried in the materia medica of the educated physician and he was supposed to know them. Professor Sayre's idea is an excellent one and one which should receive action. I hope, as I said before, the medical profession will coöperate as it should in arriving at a coöperative understanding. The perniciousness of having in the Pharmacopoeia endless preparations that are known to be unscientific is one the medical teacher can appreciate.

Others participated in the discussion, emphasizing the need of coöperation by physicians and pharmacists to bring about a reform and also in order to arrive at a better understanding relative to unnecessary and useless materia medica. The paper was referred to the Publication Committee.

PUBLICATION OF POTENT CONTENT ON ALL READY-MADE MEDICINES. IS IT DESIRABLE?*

BY OSCAR DOWLING.[1]

The topic for discussion, selected from the list sent me by your Committee, is one in which you and your confreres, health officers and physicians are vitally concerned. The signs of the times are clear—the patent "cure-all" with its flaring, sensational, lying appeal is doomed. A few years more and these will be known only as the relics and antiquities of the patent medicines' lurid and dishonorable past. This is not a prophecy; it is a conclusion borne out by the history of recent legislation.

* Read before Section on Education and Legislation, A. Ph. A., Chicago meeting, 1918.

[1] President Louisiana State Board of Health.

The Federal Food and Drugs Act, and the subsequent Sherley Amendment, are evidences of a nation-wide awakening to the evils of the disreputable, deplorable traffic which flourished by the exploitation of human weakness and human agony.

The Food and Drugs Act, as you know, makes mandatory a specific statement as to the amount of certain habit-forming drugs; the Sherley Amendment prohibits statements concerning therapeutic effect on the label, carton or other literature. These laws were passed in spite of opposition, open and secret—mostly secret—and I do not believe any one now would dare to say they are other than wisely protective.

We can recall the popularity of the multitudinous family of "bitters;" we remember the "Spring Tonics," and we know now, if we didn't then, that the basis of these and many so-called remedies was alcohol. With the enforcement of the Food and Drugs Act there was a very great change in content, and there was a passing of many of these alcoholics.

The publication of the habit-forming drugs contained in patent preparations had also a marked effect. Nearly every one is more or less afraid of morphine, opium or cocaine; when it became known that these drugs were contained in certain preparations, even the careless sufferer passed up the bottle or tablets thus labeled. The manufacturer was forced to substitute other drugs not so widely known and generally distrusted. One of the soothing syrups in 1908 contained 0.4 grain of morphine to the fluidounce; to-day we have the manufacturer's word that it is made up of senna, rhubarb, sodium citrate, anise, fennel, some other simple substances and sugar syrup. Which is likely to do the babies less harm?

The Food and Drugs Act was the initial step. It warned the public as to content, and, through the public, forced the manufacturer to lessen the quantity of habit-forming constituents. The Sherley Amendment forced him to drop or to substitute carefully guarded statements of curative qualities for the old blatantly false assertion of "instant or certain cure."

While the effect of these legislative Acts has been helpful in revealing the dangers of many nostrums, unfortunately they do not go far enough. Arsenic, lead acetate, strychnine, methyl alcohol and other dangerous drugs and substances are used in preparations now on the market. These, too, should be so labeled that the public may know the contents.

The Sherley Amendment makes no provision for control of newspaper advertising, with the logical result of columns of suggestive copy which deceive those who can least afford the experiment and the exorbitant charges.

That the American Pharmaceutical Association opposes fraudulent medical advertising is encouraging and gratifying, and its power for good is evident.

The effect of the publicity as to content, and restrictions as to effect, has lessened the sales of many patent nostrums—happily so for the consumers. Further publicity would no doubt lessen the demand for many worthless preparations more or less popular. In the light of the past, we must concede the necessity which existed for the protection of the ignorant, and not a few of the educated. We must also concede that the same need exists to-day.

I believe the opposition to publication of the formula is based on a misconception of what might occur, not what actually will happen. The manufacturer

thinks his preparation will be or can be duplicated by any one who has a mind to do so. This may be granted—but will they do so? The ingredients of medicines have been carried on the labels of some for years. How many individuals or companies have tried duplication, either for sale or use? It is true the list of ingredients is not sufficient; the proportions are necessary, but even if these also are given, how many would deliberately go into the business of re-duplicating? If this should be done, a different name must be given, and the preparation widely advertised before its sale can hurt the original. I believe the publication of the ingredients or formula should be required. It would give the public an idea of the content; it would make the manufacturer answerable for the results of his medication; it would tend to eliminate fake remedies; it would give the druggist and physician an intelligent idea of the preparation; it would foster confidence in the honesty of the manufacturer.

It seems very apparent that if any manufacturing establishment refuses to state the ingredients of a mixture, ointment, pill or solution, the indications are that it has good reasons for not wanting them to be known. Either the ingredients are worthless, and the advertisement the driving force behind the demand, or the effective ingredients are so minute in quantity or so inferior in quality as to constitute a swindle. Whichever way the matter is approached the result is the same; the public pay heavily for what they get—except in suggestion. You are familiar with examples of this kind. The cost of manufacture must be infinitesimal in comparison to the retail price; and the medicinal value small compared to the claims. It cannot be said that they are actually devoid of value; but vaseline or borax bought for one-fifth the amount charged for the advertised articles in most instances would be equally effective.

A firm that puts up a good remedy, one which is efficient and otherwise acceptable, need have no fear of losing trade by competition so long as the name or trademark is registered. But the day will come, if it has not already arrived, when the public will demand to know what they are paying out their money for. Time was when some of the one-time popular nostrums were to be found in every family medicine chest. Their decline in sale and popularity has been such that, as one druggist expressed it, they have literally become "drugs on the market" which are seldom called for. Possibly this is due to lack of advertisement; it is more likely, however, that years of trial have demonstrated how valueless they actually are.

From our office we recently conducted some investigations which gave interesting results. Our chemist was sent to interview all the druggists in New Orleans and other cities of the State. In New Orleans, and the towns adjoining, 208 retail druggists were visited. In reply to the questions formulated, the demand for the ten leading proprietaries was tabulated.

In relation to percent of business, approximate gross profits, percentage of patent preparations in prescriptions, and the attitude toward the proprietaries, we find the records show:

25.8 percent is the average percent of total business derived from patent and proprietary medicines.

19.3 percent is the average gross profit on patent and proprietary medicines.

23.3 percent is the average percentage of all prescriptions containing patent and proprietary medicines.

As to whether or not a drug store can exist without patent and proprietary medicines:

61.52 percent of the pharmacists expressed an unqualified "affirmative."

1.93 percent inclined toward "affirmative."

33.65 percent gave an unqualified negative.

Whether a drug store could, or could not, exist on U. S. P. and N. F. basis:

56.25 percent of pharmacists thought it possible.

10.27 in doubt, while 22.60 percent think it is not possible.

It is interesting and pertinent that our summary shows the majority of the retail druggists opposed to patents and proprietaries; although only 74.5 percent expressed themselves as being absolutely opposed, at least 5 percent more seemed to incline toward opposition.

In expressing a definite stand against patents and proprietaries a large number were moved by ethical reasons; that is, they believe that they are selling remedies, the value of which is doubtful and are accessories to what in many cases they consider absolute swindles. Still others regard the handling of patent and proprietary medicines as distinctly degrading to the profession, and would like to see them abolished with the hope that, with the elimination, pharmacy and pharmacists would gain in prestige and standing in the community. Many deplored a commercialized profession, which requires a certain amount of study and training, and this relegates them to a position equivalent in many respects to that of an ordinary untrained clerk.

It is conceivable that the printing of the ingredients or formula of a proprietary on the carton or bottle might possibly harm the manufacturer to a limited extent; it cannot, however, be clearly demonstrated in what way the retail man, the pharmacist, can be injured. In accumulating evidence for the Drug Store Report, the regret was frequently expressed by the pharmacist that he did not know what he was selling and wished that the firm would at least state what was contained in the bottle. The fact that 74.52 percent of all pharmacists of New Orleans expressed themselves as opposed to patents and proprietaries is significant, and it is also worthy of note that not one of the least important of their reasons for objecting was the fact that the public demand, and the struggle for self-preservation, made it necessary for them to act contrary to their personal convictions.

Most of the pharmacists are honest and honorable men and try to discharge their obligation to the public to the best of their knowledge and ability. It is to be assumed from their statements that they heartily approve of the printing of at least the ingredients on the label. Why should they not? They cannot lose by it and are bound to gain, if in nothing else than self-esteem, for it is more to the credit of the pharmacist to sell some remedy, the value of which he can vouch for, than a quack remedy of the composition of which he has not the remotest knowledge. He calls the latter the "fakes," but he does not place in this category those remedies of whose utility he is practically assured, even though their composition is not clear. He would certainly feel more assured in recommending the latter were their ingredients known to him.

There are, however, druggists and pharmacists who make, sell and advertise

their own "Just-as-good" or "Just as-bad" preparations. Whether they think so or not, they are "manufacturers" of "fake" or of reputable preparations, as the case may be. There are druggists also who lend their names to questionable "remedies." Equally with the physician, the druggist who makes or exploits a patent preparation is responsible—it may be culpable. As he knows drugs, he is the more culpable should his preparation be worthless or ineffective.

One of our convictions, based on investigations, is that the percentage of patents and proprietaries does not justify their maintenance. If there is a sudden slump in the demand, the druggist is left with a large stock for which there is no sale. Whether or not a condition of this kind is due to lack of business foresight is not a matter for discussion, but it is certain the sale of patent medicines is a business proposition and the benefit they may possibly confer on the public is a secondary consideration to the manufacturer. It is apparent to us that opposition to legitimate control of the manufacture and sale of proprietaries arises from persons or firms whose money is invested, or who have made contracts to handle a certain quantity of different preparations. It is natural that they should look out for their own interests, and it is also apparent in some cases that the manufacturer has the small dealer by the throat. We are not unaware of the tremendous power of these interests. With $71,000,000 invested it means that those having the business in hand will do their utmost to head off interference. It means that money and influence will be used to the benefit of the Company, and it is logical that they do not consider the small dealer or the public.

It is urged that the average physician does not know the pharmacologic action of drugs, and that he does not utilize the Pharmacopoeia and the National Formulary. That he does use the proprietaries. Undoubtedly there are physicians who are guilty as charged. But if a reputable physician uses the proprietary, there is a reason. He finds that many proprietaries are better acting and more reliable productions when manufactured by large drug firms than a similar preparation put up by a pharmacist according to the National Formulary. The reason here is clear also. The pharmacist has not had the same experience in compounding as those of the large wholesale houses, and the result is inferior. This alone is sufficient to cause doubt as to the ability of the pharmacist, and we know in all too many instances it is borne out by the facts. Every reputable and conscientious physician would welcome the publication of the formula; he would be glad to have the opportunity to acquire a knowledge of the constituents of the preparation he thinks superior to the compound which the pharmacist would put up for him, and that it would add to his confidence in it there can be little doubt. The physician, in common with the druggist, is a victim of circumstances; for both the line of least resistance is the easier.

We know, however, some doctors are not afraid to speak their minds on the subject of proprietaries which make false therapeutic claims. A few months ago we sent the formulas of four preparations, with a set of questions, based on the advertisements of each, to 174 noted physicians. One hundred and eleven replied to the first, and 63 of these answered "NO" to all of the eight assertions appended to that formula. A number answered "possibly" to one or more of the questions, or made other qualifying answers, such as "inferior," "not good," or "don't know." A large number replied to all, and voluntarily offered com-

ments. From the opinions expressed, I have selected a few that are typical:

"An unscientific preparation without value."

"A peculiar shotgun combination, with neither scientific nor pharmaceutical reasons."

"Its one virtue seems to be that it is harmless."

"This formula, in my humble opinion, is the limit. I am constrained to believe that the tablet form would—if small enough—make its exit as its entrance as hard as a steel ball."

"I have never been an advocate of shotgun prescriptions."

Our investigations among the druggists of Louisiana, and the summarized replies to our questions, give ample proof that the publication of the patent drug content is desirable. Many druggists, not burdened with contracts, are frankly opposed to the handling of patent preparations, the formula or ingredients of which are secret. Others, among them some who buy large quantities of these medicines, realize the demand is precarious and the results of sale unsatisfactory. Therefore, preparations bearing on their face their content would be more acceptable to the retailer.

The physician's use of the proprietary is largely habit, induced by ignorance, indolence, or the circumstances which force him to choose between the manufactured article and a poorly prepared substitute. The conscientious man wants to know the composition of everything he gives his patient, and rightly. He can be relied on to commend any movement which would give him definite information. It goes without saying the prepared medicines, with few exceptions, are not satisfactory to the skilled physician and can not ever meet his requirements. It is likewise true that if these became unprofitable to the manufacturer, the competent pharmacist would come into his own and the profession would grow in usefulness and prestige.

The patent and proprietary have been called the "poor man's medicines." Observations indicate laxatives and cathartics, liniments and cough syrups, have a wide sale. The physician knows even these should not be used without advice and direction, but until the public is likewise convinced, too drastic criticism or action would be futile. We concede at present there is a legitimate field for some proprietaries, but these are not in the class that would be put out of business by the printed formula.

The uncritical public is the great factor in this problem. It is they who have been exploited by the unscrupulous multi-millionaire manufacturer and his equally unscrupulous agents. You will agree that the manufacturer without medical, ethical or moral standards has utilized brains and money to swindle the credulous; you will agree that to deceive with false hopes the ignorant and the sick is a crime even if it is not so listed in the statutes. The attitude has been, the public is legitimate prey to be fleeced; "they need not buy if they don't want to, but every device and every suggestion will be used to make them buy." The "secret" formula was the strongest asset of the business; the mystery appealed and it was made to do full duty. Loaded with stock, the retailer was forced often to devise ways and means to sell, hence the flaring windows with a fifty-foot tapeworm, a dozen rusty rattle snakes, or the living automaton pointing out the merits of the wonderful "Cure-all."

On the back of the carton of a recently analyzed preparation there is a statement by the manufacturers to physicians and the general public which sets forth the reasons why the preparation is efficient, and adds—"but knowing the proper prejudice of many against using any medicine prepared from concealed formulas, and to protect the public from many nostrums and worthless preparations with which the market is flooded, we have concluded—on the request of a number of physicians—to indicate on each bottle of what the medicines are composed."

This Company recognized the changing psychology of the public mind. They believe publicity good business. They have accepted and made use of the new attitude. This is common sense. There are still those who will buy to their own undoing, but the demand that all remedies possess merit is becoming more and more insistent. The day of general acceptance of the flaring label, the Almanac and the fraudulent testimonial is past. The more intelligent are on guard. This points to an educated public which, in time, will refuse to buy the secret preparation.

The example given is positive evidence that secrecy is no longer desirable.

I do not doubt that the publication of ingredients or formulas will awaken intelligent discrimination; it will lead to a transfer of approval from remedies now popular to others. This will mean loss to the manufacturer, and to the retailer who is stocked with old medicines. But the financial loss will be temporary, and is unimportant in comparison with the benefit which will result to the public. The honest manufacturer and those handling his products would have nothing to fear, for they, too, would benefit by the increase in public confidence. The maker of worthless preparations would go to the wall, which in time would be to the advantage of those who placed on the market only an honest product.

To summarize, the protective effect of the Federal Law is so apparent, no one would have the temerity to suggest its repeal; the druggists—many of them—are tired of the uncertainty connected with the sale of secret patent remedies; the pharmacist, if the patents were dropped, could hope for better pay and deserved recognition; the honest physician could use with confidence a preparation bearing the formula; the manufacturer would have nothing to lose if his medicine was effective; finally, the secret patent preparation is on the run and it is common sense to accept the situation and to join the ranks of those who live and act in the belief that there are some things which have a greater value than just money.

Is it desirable to protect from themselves the credulous and the ignorant? Is it desirable to condemn a dishonest business standard? Is it desirable to lift the retail drug business to a higher plane? Is it desirable to warn and teach suffering humanity? I leave with you the answer.

THE DRUGGIST AS NOTARY PUBLIC.*

BY EMIL ROLLER.

The vocation of the American Pharmacist being partly scientific and partly commercial compels him to pay just as much attention to the commercial side

* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Chicago meeting, 1918.

of his business as to the ethical, and often more to the former than to the latter. He therefore has to carry a great many side-lines not pertaining to pharmacy at all, in order to earn a livelihood. Now instead of reaching out for more side-lines, I should like to call the attention of my colleagues to a vocation entirely compatible with their professional standing, I mean that of Notary Public.

Since it is required by the Pharmaceutical Syllabus that each college of pharmacy of acknowledged good standing must include in its curriculum seventy-five hours of lectures in Commercial Law and Business Practice, the young pharmacist, having attended such a course, is by reason of the training he has acquired at these lectures able to perform the duties of a Notary Public a great deal better than many of the persons in whom this office of public trust is now vested. The general duty of a Notary Public consists mostly in taking affidavits and acknowledgments of signatures on legal papers, protesting of notes, executing of bills of sale, leases, mortgages, powers of attorneys, etc., etc. The income from these sources ranges from twenty-five cents for common acknowledgments, to two dollars and fifty cents for protesting notes, and then to between five dollars and twenty-five dollars for executing leases, bills of sale and other more involved documents. The receipts from the execution of these papers and similar ones is clear profit involving only the time consumed in drawing them up.

The wording of these papers is not as difficult as it seems at first sight, because printed forms are obtainable with the proper phraseology and it necessitates only the filling in of names and other stipulations agreed upon between the interested parties to complete the document.

The holding of the office of Notary Public will add greatly to the standing of the pharmacist in his community. To be appointed to the office it is best to procure the services of a lawyer or of your congressman. After the appointment, it is always advisable to see a lawyer and get instructions on essential points in making out documents to conform with the law of the State where the instrument is executed.

Nearly all official documents must either be a 'nowledged or sworn to before a Notary Public. His services therefore are required frequently.

I strongly recommend to my fellow pharmacists to either have themselves appointed, or procure an appointment for one of their clerks. This suggestion, if followed, will bring a great many people into the appointee's place of business who would otherwise not have come, and my experience has proven that they will ultimately become regular customers.

The druggist as a Notary is a public convenience.

HISTORY OF GLASS, ANCIENT AND MODERN.*

BY W. W. FIGGIS.

Among the first discoveries due to chance, and perfected by man's intellect, glass is certainly one of the most important.

Although glass satisfies a considerable number of our most ordinary wants, it is also to *it* that we must attribute, to a large degree, the ever progressive march

* Read before Section on Historical Pharmacy, A. Ph. A., Chicago meeting, 1918.

of science. Indeed it is by multiplying the strength of man's organ of sight that glass lays bare the most hidden works of creation to his investigation, and by degrees everything is seen, studied, explained and analyzed, including the infinitely great, as well as the imperceptibly small. Few questions have been more discussed than that of the origin of glass.

Tubal-Cain, son of Lamech and Zellah, who was the eighth man from Adam, was born 3870 B. C., which would carry us back over five thousand years of this world's history; it is stated that on the coast of Palestine, near the mouth of the River Belus, he, with others, was preparing for their repast, and not finding any stones on which to place their pots, took some cakes of nitre for that purpose. The nitre being subjected to the action of fire with the sand of the shore, produced transparent streams of an unknown fluid, and such was the origin of glass. Pliny tells us that sand suitable for glass-making is found at the mouth of this river Belus, which flows into the Sea of Judea. This opinion is reported with some variations on the authority of Flavius Josephus by Palisey, but this account has found and still finds many doubters among chemists, who claim it impossible to qualify substances in the open air, which in our day with our improved processes can only be fused by means of furnaces constructed expressly for that purpose, but of this there is no doubt, that glass was made centuries before furnaces were thought of, and the question remains, HOW? If this be doubted we cannot place in chronological order the productions found in great numbers in our museums. While dating back to an extremely early epoch, many of these articles bear no indication of the place, or date of their manufacture; at the same time there is no doubt that to remote antiquity belong the Theban glass makers, who are represented in paintings on the tombs of Ben Hassen 3500 B. C. These paintings represent a Theban using a blow-pipe, very similar in all respects to those used at the present day (Wilkinson, Vol. III, 89).

Signor Drovetti found at Thebes a dark blue piece of glass, which is now in the British Museum, and according to Lepsius's chronology establishes the date, because this piece contained the name of Nuantif IV. Martial alludes to the importation of Egyptian glass into Rome, and it is mentioned in an ordinance of Aurelian, also of this period. About this time, Hadrian in a letter addressed to the Consul Servianus mentions glass-blowing as one of the chief industrial occupations of the inhabitants of Alexandria. The Phoenicians probably derived their knowledge of glass from Egypt. Many towns in Egypt practiced the art of glass manufacture, for Pliny boasts of the glass manufacturers of Sidon, and Herodotus and Theophratus sing praises of the marvelous productions of the Tyrians.

The fame of these different manufacturers of glass could not remain unknown, and later the Romans under Caesar Augustus subdued Egypt and ordered that glass should form part of the tribute to be imposed on the conquered. Then Rome developed the art of making glass in a most remarkable manner, and in some respects has never been excelled or, perhaps, even equaled. (Pliny Nat. Hist., XXXVI, 26–27). Theodosius II, Roman Emperor A. D. 408, desiring to encourage glass industries, exempted all glass workers from personal taxes.

In the middle ages Assyria was making glass, and a vase of transparent greenish hue was found in the north-west palace of Ninevah, and is now in the British

Museum; on one side was engraved a lion, on the other the name of Sargon, King of Assyria (722 B. C.).

The Greeks of the shores of the Mediterranean excelled in the art of making glass at a very early period, some centuries before the Christian era.

Constantine I, surnamed the Great, born A. D. 274, whose seat of Empire was Byzantium (Constantinople), hastened to attract glass makers from the West. In spite of all these successes in the East, the time came when the West excelled in its old industry; Venice reclaimed it, and in the 14th Century nearly monopolized the industry, according to Italian writers Carlo Marin and Count Filiasi, who also state that some families fleeing from war took refuge on the islands of the lagoons. Venice endeavored to hold this trade and issued strict statutes that if a workman carries his art into a foreign country an order to return will be sent and, if not obeyed, his nearest relatives will be put in prison, and if he persists in staying away an emmisary will be sent to kill him. Several instances of the carrying out of this threat are recorded, but even with this threat, it was not sufficient to stop the spread of the glass industry into Germany, Bohemia, France, England and Belgium.

It is interesting to note the historical point made about gentlemen glass workers, showing that the mere trade of glass-making carried with it that every one of them was ennobled by the fact of the nature of his trade.

At this juncture a reasonable question is—Did the ancients employ glass bottles? Yes. Egypt has left us bottles made of simple glass and others covered with wicker work or papyrus stalks. The latter offer the greatest resemblance to those now used for Florence oil, and are still used by the Egyptians under the name of "damadjan."

Documents prove that glass bottle factories were run in France, 1290, by a man called "Macy." Also, in 1469, John Petit Fay was commissioned by the Court of Louis XI to manage a bottle factory.

The first industrial enterprise established in the United States was in Virginia, soon after 1607, near Jamestown. In 1639 coarse bottles were made in Salem Mass., in 1683 in Philadelphia; two factories were operated in New York City in 1732. In 1747 one factory was operated in Connecticut, one in Brooklyn, N. Y., in 1754, and one in Germantown, Mass., in 1760. In 1738 the first factory was started in New Jersey in Allowaystown, Salem County, by Casper Wistar, who brought over four skilled workmen from Rotterdam. In 1795 the first factory was started in Pittsburgh, Pa., and in 1813 there were five factories in operation in that town.

The appearance of the neck of an old bottle is the surest test of its age; the mouths of our first bottles were cut with shears while in a plastic condition, which explains the irregular edge, entirely devoid of any rim; the base invariably possesses a rough circular scar, formed by breaking the bottle from the punty rod, which holds it while the workman finishes the neck. Now of course, a snap tool is used.

Between the years 1840 and 1850 there seems to have been remarkable progress in glass bottle making in the Eastern states, and Pennsylvania in particular. Old shapes can still be found in nearly every farm-house, of curious designs—patriotic, political and masonic.

One of the first successful glass works in the United States was at Nauheim,

Lancaster, Pa., conducted by Baron William Henry Stiegel, about 1769. In 1771 a glass factory was started in Philadelphia, Pa. (Kensington), by Robert Towars and James Leacock and taken over in 1783 by Thomas Leiper, then, in 1803, by James Rowland & Co., afterward owned for about four years by Thos. W. Dyott; in 1842 by Henry Seybert; in 1844 by H. B. Benners, S. Decatur Smith and Quinton Campbell, Jr.

In 1775 the Stanger Bros. erected a glass factory in Gloucester Co., New Jersey, at a point afterwards known as Glassboro. In 1813 Rink, Stanger & Co. established new works, and one of the most remarkable old bottles made in the United States came from this factory during the presidential campaign of 1840, in the form of a log cabin for an enterprising liquor merchant in Philadelphia. Another one of the most characteristic shapes was what is known as the "Jenny Lind," with a globular body and a long, slender neck, in 1850, when the great singer came to America under the direction of P. T. Barnum. The original metal mould in which these bottles were blown is still in existence in the oldest glass factory in the United States, known as the Whitney Glass Co., which has been absorbed by other interests, and now forms a part of the Owens Bottle Machine Co.

In 1806 James Lee and others started a glass plant on the banks of the river where Glasstown is now situated; it passed into the hands of Gideon Scull, then Nathaniel Solomon managed it for a company of blowers, but made a failure. In 1829 Burgin and Wood took over the plant; in 1830 the name was changed to Burgin, Wood & Pearsall; in 1833 to Burgin & Pearsall; in 1836 to Scattergood and Booth Co.; in 1838 to Scattergood, Haverstick & Co.; in 1844 to Scattergood & Whitall; in 1845 to Whitall & Bro.; in 1850 to Whitall Bro. & Co.; in 1857 to Whitall Tatum & Co., and in 1901 to Whitall Tatum Company, Incorporated.

Finally as a matter of interest you may wish to know the probable inception of the druggist's show bottle:

. When Julius Caesar invaded Ireland, a boat was sent ashore from the offing to locate the most advantageous landing-place. A spot was selected on a shelving shore directly opposite a certain apothecary's shop, in the windows of which were certain large bottles containing drugs which were in process of maceration, and the contents showed different colored liquids. On a promise of immunity as a reward, the arrangement was made that this apothecary would place lanterns behind these bottles to guide the landing of troops, which was made that night. The undertaking was successful and, to commemorate the same, an edict was issued by Julius Caesar that thereafter all apothecaries would be honored by being allowed to use colored carboys to identify their establishments.

"The Pharmaceutical profession being one which demands knowledge, skill and integrity on the part of those engaged in it, and being associated with the medical profession in the responsible duties of preserving the health and dispensing the useful though often dangerous agents adapted to the cure of disease, its members should be united on the ethical principles to be observed in their relations to each other, to the medical profession and to the public."

THE ADMINISTRATION OF CERTAIN DELIQUESCENT AND LIQUID DRUGS IN CAPSULES.

N. S. DAVIS, M.D., CHICAGO.

It is so much pleasanter to take medicine in capsules than in other ways that it has been my habit when I can do so to administer it in them. Pharmacists find it impossible to dispense extemporaneously in capsules many deliquescent substances and most liquids. A dozen or more years ago my attention was called to the possibility of dispensing many such substances in a capsule by using a wax mass. In this way potassium iodide and similar drugs can be given, also guaiacol, oil of sandalwood and many other liquids which one wishes to prescribe in doses of from 5 to 10 minims. The iodides can be given in doses of 10 or 12 grains (from 0.5 to 0.8 Gm.), and the pill will be readily absorbed, as is shown by finding iodine in the saliva in three minutes or less after such a capsule is swallowed.

The capsules are permanent, keeping for weeks ordinarily and in the hottest, dampest weather, if placed in a corked bottle.

For the making of a pill to be placed in a capsule containing sodium or potassium iodide in doses of 10 or 12 grains (from 0.5 to 0.8 Gm.), about $1^1/_2$ grains (0.1 or 0.15 Gm.) of the wax mass is needed. Red mercuric iodide and other drugs can be incorporated in the same mass if they are required.

To make a pill containing guaiacol, oil of sandalwood or similar liquids in doses of 5 minims or thereabouts, the same quantity of mass is needed.

I have often given iodine incorporated with this mass, and have obtained from it as prompt and as good results as when it was given in solution. But I have found it possible to give it, without discomfort to patients, in larger doses. For instance, from 2 to 4 grains (from 0.15 to 0.25 Gm.) can be given in this way, though I rarely have given more than $2^1/_2$ grains at a time. I have made it a practice to dilute the iodine well with the mass in order that the pill may not cause gastric discomfort, and possibly I use more of the mass than is necessary for this purpose. I usually prescribe at first 1 or 2 grains (0.05 or 0.10 Gm.) with 5 grains (0.3 Gm.) of wax mass. Undoubtedly, the oil in the mass is responsible for carrying the iodine and for diluting it and releasing it so as not to cause gastric discomfort. When administered in this way, iodine appears with its usual promptness in the saliva. Cascara, aloes, codeine and many other drugs can be incorporated with it when they are needed.

The wax mass is made of one part beeswax and three parts of castor oil. These ingredients are melted and mixed by heating them gently. When liquefied and thoroughly mixed, the mass is allowed to cool. It makes a somewhat granular pill. I do not know who invented the mass, and I have rarely found a pharmacist who knew of it.

I have never seen the castor oil produce looseness of the bowels, and we would not expect it to, so little of it is administered at a time.

Guaiacol and oil of sandalwood and similar substances can be readily mixed with from one-half to equal parts of beeswax and made by gently heating into a mass. Such a one, however, is needed only when a prescriber is using these substances with frequency.—*Journal A. M. A*

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and its branches shall become the property of the Association, with the understanding that they are not to be published in any other publication than those of the Association, except by consent of the Committee on Publication."—By-Laws, Chapter X, Art. III.

Reports of the meetings of the Local Branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter.

CHICAGO.

The one hundred and first meeting of the Chicago Branch of the American Pharmaceu tical Association was held at the hotel LaSalle Friday evening March 28, 1919, President A. H. Clark presiding. A large number of members and friends was present.

The subject of the meeting was "Pharmacopoeial Revision," and the discussion was very ably opened by Dr. Carl Alsberg, of Washington, D. C. Dr. Alsberg was followed by Dr. Henry Kraemer, of the University of Michigan, and other notable speakers were: Dr. Bernard Fantus, Prof. C. M. Snow, Secretary Samuel C. Henry, of the N. A. R. D., Chas. Falkenhainer, of Dubuque, Iowa, Sceretary H. C. Christensen, of the N. A. B. P., Prof. W. B. Day and Wm. Gray.

The discussion was very profitable and the principal conclusions could perhaps be summarized as follows:

First, While the standards of the U. S. P. and N. F. could possibly be improved upon and made much more definite in many instances, these two books are an invaluable aid to all those intent upon maintaining a high standard of drugs. It is greatly to be desired that standards as good as these be devised for many drugs and medicines not included in these works but which have a wide use and enter commerce in large quantities.

Second, Purity and standardization rubrics in the definition or the text of the monographs can be extensively used to advantage though there may be a question as to the value of the description of tests and assays for determining these standards. However, wherever test and assay processes are included in the U. S. P. and N. F. they should be strictly followed.

Third, A maximum-minimum standard for drugs and chemicals, and especially for the finished preparations of drugs, should be discontinued and a single standard adopted instead. A sufficient tolerance from the standard is always allowed by courts and authorities anyway.

Fourth, The nomenclature and spelling of the U. S. P. and N. F. should, perhaps, not be accepted with the same idea of standard and legality as the statements made in these books, yet such a weight of opinion should lie back of the nomenclature and spelling used in these works that they should be considered standard in these respects. Certainly faddy changes in spelling or nomenclature backed by the opinion of one or a few persons should not be considered.

Fifth, The use of alcohol in the preparation of medicines, both as an extractive and preservative, should receive the most careful investigation. The introduction into the U. S. P. and N. F. of more classes of medicines in which alcohol is not present should be considered.

E. N. GATHERCOAL,
Secretary.

The one hundred and second meeting of the Chicago Branch of the American Pharmaceutical Association was held at the LaSalle Hotel, Friday evening, April 25, 1919, with President A. H. Clark in the chair and a good attendance of members and visitors.

Samuel C. Henry, General Secretary of the National Association of Retail Druggists, led the discussion on the subject: "Recent Rulings Regarding Narcotics and Alcohol." Others who took part in the discussion were: Wm. Gray, C. M. Snow, J. H. Wells, Chas. Caspari, Jr., of St. Louis, F. W. Metzger, of Springfield, W. S. Denton, of Beardstown, Robt. W. Sterling, of Dixon, H. C. Christensen and W. B. Day.

Many interesting points regarding the application of the new amendments to the narcotic law, and the new taxes on proprietary medicines and soda fountain sales, were made.

Thus especial emphasis was laid on the fact that the retailer of narcotics can in no way act as a wholesaler and can dispose of narcotics only by prescription or in exempted preparations. The question arose as to how a 5 per-cent solution of cocaine could be sold to a physician for office practice and Mr. Henry stated that such a solution could not legally be sold, though the government officials probably would make a ruling covering such cases and making provision for such sales.

Special attention was called to the stamp taxes to be collected upon all proprietary medicines, toilet articles, etc.; anything in which any kind of a proprietary right was claimed must bear the stamp. Such items as Bayer Aspirin Tablets, Lilly Coco-Quinine, Adrenalin solution, were mentioned as taxable. The tax stamps should be used whether the article is sold in original packages, in broken packages or in prescriptions. The exception among toilet articles was toilet soap, including soaps in any form for shaving, such as shaving creams and powders. Any soap, however, which claims medicinal properties is taxable.

Mr. Henry called special attention to the necessity of placing and cancelling the stamp at the time the sale is made and when the customer is called upon to pay for it. This leaves no question in the customer's mind that he is really paying the tax to the government.

Also, in collecting the tax on sales at the soda fountain the customer should pay the tax direct, rather than by increasing the price of the drink, even though the cost of collecting the tax may be an added burden.

E. N. GATHERCOAL,
Secretary.

NASHVILLE.

The regular meeting of the Nashville Branch of the American Pharmaceutical Association and the Nashville Drug Club was held Thursday, April 24. D. J. Kuhn presided.

The main feature of the afternoon was the discussion of the new Tennessee Pharmacy Law, which embraces the following features:

The Board of Pharmacy shall consist of five members, three of whom shall be graduates in pharmacy; they shall serve for five years, but not be permitted to succeed themselves. The Governor is authorized to appoint one member of the Board annually from a list of five names submitted to him, these to be selected by ballot by the Tennessee Pharmaceutical Association. The registration fees are $2.00 and $1.00, and the Board is to pay $1.00 for each member to the State Association, which makes them automatically members of the Tennessee Pharmaceutical Association. One meeting of the Board must be held each year in Nashville. The applicants for registration must have educational requirements equal to 14 High School units. Examinations are provided, but persons who have had five years' experience in a drug store may register as assistants, and after serving five additional years may be registered as pharmacists upon the recommendation of their preceptor and the endorsement of two physicians. Permits may be granted in small towns. Reciprocal registration is provided for with other States.

Persons convicted of a felony or addicted to the liquor or drug habit may have their certificates revoked.

The latest copies of the United States Pharmacopoeia and National Formulary are required to be kept in each pharmacy.

No establishment can use the name of drug store unless under the charge of a registered pharmacist. Proprietors are required to pay an annual registration fee of $1.00.

The provision allowing physicians to register as pharmacists is repealed.

S. C. Davis read and explained the provisions of the new narcotic law recently passed and which is now in effect. It provides for the supply of a specified amount of narcotics to addicts for thirty days. The maximum quantity of the different narcotics which can be prescribed in a day's time to patients other than addicts is specified. Such order or prescription must have the endorsement of both the attending physician and the health officer. Registration of purchase and sale are required.

The passage of a new insecticide law was also reported. This is similar to the federal law.

The subject of shorter hours was discussed by Messrs. Kuhn, Snow, Wilson and others, who expressed their opinion that the hours of pharmacists should be shortened and this be put into effect by legislation.

This was one of the most interesting meetings of the two Associations.

WILLIAM R. WHITE,
Secretary.

NEW YORK.

The April 1919, meeting of the New York Branch of the American Pharmaceutical As-

sociation was called to order by President Lehman in the Lecture Hall of the New York College of Pharmacy Building on Monday evening, the 14th, at 8.15 P.M. Twenty-two members were present.

The Treasurer's report was received and showed a balance on hand of $122.20.

Member of the Council: Professor Jeannot Hostmann brought in no report.

Membership Committee: An application was received from Edwin C. Steinach, 776 Melrose Ave., New York City, for membership in the parent organization.

Fraternal Relations: Dr. Leon Lascoff being absent, no report was received.

Audit Committee: Dr. Jacob Diner reported that there were no bills on hand.

Legislation and Education: In the absence of E. J. Kennedy, Hugo Kantrowitz made a brief report, which was received with the thanks of the members.

Resolutions on the death of Professor Joseph Kahn, drawn up by Dr. Joseph L. Mayer, were adopted, and the committee was discharged with the thanks of the Association.

SCIENTIFIC SESSION.

The third "three-minute letter" of the Committee on Local Branches was received by the Secretary. Messrs. Caswell A. Mayo, Hugo H. Schaefer, Jeannot Hostmann, Jacob Diner, H. V. Arny, and Joseph L. Mayer took part in a discussion with regard to this letter.

Progress of Pharmacy: Dr. George Diekman brought in a lengthy report and abstracts on the following topics:

Japanese Black Mint.

Substitutes Used in War.

Industrial Development of Acetic Acid and Acetone.

Disinfectant Properties of Alcohol.

Potash from Kelp.

Considerable discussion followed the reading of this report, which was accepted with thanks by the Branch.

A paper written by Miss Adelaide Rudolph n "Pharmaceutical Medals" was read by Caswell A. Mayo.

Arthur C. Wyman, a Fellow of the American Numismatic Society, then gave a very interesting talk on the early history of medals, also reviewing some of the work of his Society.

Under regular procedure the meeting was declared adjourned.

HUGO H. SCHAEFER,
Secretary.

NORTHWESTERN.

The Northwestern Branch of the American Pharmaceutical Association at its April meeting held its annual election, and the following were elected to office for the year 1919:

President, Charles Huhn, Minneapolis.

Vice-President, Robert L. Morland, Worthington.

Secretary and Treasurer, F. A. U. Smith, St. Paul.

Members of the Executive Committee, Stewart Gamble, Minneapolis; W. A. Abbett, Duluth.

CHARLES H. ROGERS,
Secretary.

PHILADELPHIA.

The April meeting of the Philadelphia Branch of the American Pharmaceutical Association was held Tuesday evening, April 22, 1919, President Griffith occupying the chair.

The Auditing Committee, Prof. F. P. Stroup, Chairman, reported the accounts of the previous Treasurer correct. The President announced that twenty-four members of the Senior Class of the Philadelphia College of Pharmacy so far had become members of the parent body, all of whom he hoped might become members of our branch.

The third of the series of "Four Minute Papers" was read by the Secretary. The paper was written by Editor Caswell A. Mayo, of the American Druggist on "Prohibition Fraught with Danger to Pharmacy."

There was a motion made that the discussion of this subject be deferred to a future meeting, when the subject could be the basis of several interesting papers.

There being no other business, the speaker of the evening was introduced. Mr. Theodore A. Seraphin, Inspector of Weights and Measures, presented the subject: "Prescription Scales and Weights." The subject was a timely one, having been chosen because of an article in one of the Philadelphia newspapers claiming that many deaths were resulting from faulty prescription scales and weights. Mr. Seraphin stated that the inspection of pharmacists' scales and weights was yet in its infancy. Out of Philadelphia's 1200 pharmacies only 44 have been inspected. Out of 71 scales inspected in these 44 pharmacies, 66 percent were found incorrect. Out of 1126 weights inspected 37 percent were found incorrect. This is, however, no fair estimate of the scales and weights in all Philadelphia pharmacies on account of the small part inspected and

especially because such inspection was made in the foreign quarters of the city.

The paper was followed by an interesting discussion by Messrs. Friedman, Glass, Hahn, Kraus, Lowe Reese. Hendrickson, Hunsberger, Ehman, Gershenfeld and Cliffe. A motion for a rising vote of thanks to Mr. Seraphin was made and adopted.

Mr. W. L. Cliffe then referred to the Leslie Bill, No. 732, introduced in the Pennsylvania State Senate, and explained the ridiculous provisions of the bill which, if passed, would prevent the sale and use of volatile anodynes and anesthetics and synthetic hypnotics and anodynes without a physician's prescription. The following resolution was made and adopted with instructions to forward a copy to the Committee on Health and Sanitation of the Pennsylvania State Senate.

"WHEREAS, There has been introduced into the Pennsylvania State Senate a bill called the Leslie Bill, No. 732, intended to regulate the sale and use of narcotics, volatile anodynes and anesthetics, and synthetic hypnotics and analgesics, and

"WHEREAS, The Philadelphia Branch of the American Pharmaceutical Association is anxious to coöperate with legislation intended for the public good and especially so with legislation relative to public health and the sale of medicines, and

"WHEREAS, There are now on our statute books laws which, if properly enforced, would amply regulate the use and sale of narcotics; therefore be it

"*Resolved*, That the Philadelphia Branch of the American Pharmaceutical Association vigorously protests against and oppose the passage of any such bill which cannot possibly benefit the public but which would be a distinct disadvantage as the bill would prevent the use and sale of many ordinary remedies for trifling ailments except on a physician's prescription; be it further

"*Resolved*, That such a bill should receive no favorable report from the Committee on Health and Sanitation of the Senate of the Commonwealth of Pennsylvania."

IVOR GRIFFITH, *President.*
ELMER H. HESSLER, *Secretary.*

There were about thirty-five persons present and the meeting was indeed an interesting and profitable one.

ELMER H. HESSLER,
Secretary.

CORRESPONDENCE

SOLDIER AND SAILOR PHARMACISTS.

WORK OF THE A. PH. A. ADVISORY COMMITTEE.

The re-establishment of soldier and sailor pharmacists is steadily progressing. Indications are that the discharge of pharmacists from the Service has not been in proportion to the total discharges which have taken place to this time, and this seems to be explained by the fact that many of the pharmacists are retained at Base and Camp Hospitals. The next few months are likely to bring discharges for a greater number, and the A. Ph. A. Advisory Committee is making every effort to have openings for all of them. A great many of the returned soldiers have found good positions, through the Committee, and at present in many sections of the country there are still many good positions to be had.

The Committee has also endeavored to aid in the re-establishment of chemists, and has been able to help some of them, but the demand for chemists seems very limited, and many who have their discharge from the Service are still without positions. It is requested that chemical and pharmaceutical houses which have openings for chemists list such openings with the A. Ph. A. Committee, which is anxious to give every possible assistance.

President LaWall, of the A. Ph. A., has just issued the following message:

To the Pharmacists Who have Served their Country in the Army and Navy of the United States of America:

It is my privilege, as President of the American Pharmaceutical Association, to thank you collectively, on behalf of organized professional pharmacy, for the service you have rendered your profession during the war and since the signing of the armistice. You have upheld the best traditions of your calling and that, too, in the face of adverse conditions and lack of official recognition of the importance of your work by being given commissioned rank in a distinctive pharmaceutical corps.

The excellence of your service has been attested by many who were your immediate superiors, and glowing tributes have been unofficially paid to the character and efficiency of the service rendered by the pharmacists in the field and in the many hospitals. Some will remain forever in Flanders' fields, others have been gassed, wounded and shell shocked. All who have come back or are intending to come back will doubtless do so with new viewpoints, new aims and ambitions and new ideals.

Much of your experience must have impressed upon you the fact, first, that it is efficiency that counts, and, second, that pharmacy has possibilities of greater development along professional lines than it has shown in recent years. We look to you to come back and "carry on" in your former calling with renewed ambition to serve along the higher avenues of your capabilities.

One of the things you must have realized is the value of organization . Organized effort accomplishes things which are impossible without it. Organization carried to the nth power won the war. Organization has given to the medical profession all for which it asked. Lack of organization has been the cause of pharmacy failing to gain even its minimum deserts, and this in the face of the fact that pharmaceutical societies similar to the medical societies exist, but which fail of their highest goal through lack of support.

Your experience and observations should make you hasten, upon your return, to ally yourselves with every organization of your fellows that makes for progress, and more especially the American Pharmaceutical Association. This is the organization broadest in its scope, highest in its ideals, the organization which has kept alive the spark of professionalism which shall eventually kindle pharmacy throughout and neutralize that ultra-commercialism which is a poison to professional progress.

And when you do come back and join these pharmaceutical organizations that are waiting with open arms to welcome you to their ranks, we want you to bring your enthusiasm, energy, and activity to bear in helping to solve the problems which confront pharmacy. It is to you, the young men of the present, that we look for the progress of the future. From among your ranks will come the leaders of to-morrow.

To you who are still in the earlier stages of your professional work, we feel that no arguments will be needed to convince you of the advisability, nay, the necessity, of completing your pharmaceutical education, if it has been interrupted by your service; or if you have never been to college, of beginning such a systematic education as soon as possible after your discharge. The successes of the future will be the successes of educated men. Pharmacy is no exception to the rule. Pharmacy needs you and can offer rewards commensurate with the energy and interest expended. It has greater possibilities than ever, and you can transform those possibilities into realities if you devote the same energy to developing your future that you have shown in your work in the Service.

Pharmacists of the Army and Navy, we want you to help us and we want to help you. You will find organizations waiting to help you find positions, if your former ones are not available. You will find your Alma Mater (if you are a college man) will do everything needed to make the completion of your education possible in the shortest time consistent with thoroughness and adherence to legal requirements. You will find a warm welcome awaiting you in every community. Every college will throw open its doors to receive you and give you some kind of assistance if you desire it.

American pharmacy is proud of you and welcomes you back to your profession with sincerity and good wishes for your future success. CHARLES H. LAWALL.

(President of the American Pharmaceutical Association.)

The Committee has found its greatest difficulty in reaching the men in the service, and this is particularly true of those who are overseas. Publicity has been sought in every possible direction, but for some unexplained reason every effort which concerned the work across the water has encountered an insurmountable barrier. In that respect the Government Departments seemed ready to extend any aid, and while the Committee had been promised much help in that direction by the Y. M. C. A., it also failed in the end.

GOVERNMENTAL COOPERATION.

Failing in every direction to secure the needed publicity for this work overseas, the Chairman again appealed to the Secretary of War, with the result that he finally secured a promise of

Governmental coöperation. The work of the A. Ph. A. Advisory Committee will now be brought to the attention of every man in the Service, by means of a booklet which is being published under the direction of Colonel Woods, entitled "Where Do We Go From Here?" A copy of this booklet will be handed every man in the Service. In addition it is also contemplated to give information regarding the Committee's work to the men in the Service by means of a War Department Circular. Captain Hammond, of the office of the Special Assistant to the Secretary of War, has taken a special interest in the work of the Committee, and is extending further aid through reference to the more important bodies engaged in war activities. It is realized that the larger part of the Committee work remains to be done, but with the active coöperation of the War Department there is now further assurance that it can be done. There will soon be many men looking for positions in drug stores, and a scarcity of drug clerks will then be a thing of the past. With the assistance of State Boards of Pharmacy and State Pharmaceutical Associations the Committee is enabled to continuously list positions that are open in all sections of the country, and hopes to take care of every man in need of a place.

FRANK H. FREERICKS, *Chairman.*

VOCATIONAL TRAINING FOR DISABLED SOLDIERS AND SAILORS.

To the Editor Journal A. Ph. A.:

The great difficulty encountered by the Government in re-educating disabled soldiers and sailors is to get information of the opportunity to them. There is an astonishing number of these men out in civil life badly handicapped by their injuries, but endeavoring, nevertheless, to work. It is most amazing the ignorance of the average man and woman about what the government stands ready to do and is doing for these men.

This Board is endeavoring to spread this information as widely as possible in the hope of alleviating the miserable condition of some of these disabled soldiers, and I am asking you if you will not print the enclosed, or as much as you can find space for, in any way which seems to you likely to attract attention? It is a little piece of patriotic service, whose object is most laudable.

Very sincerely yours,

CHARLES H. WINSLOW,
Chief, Division of Research.

EVERY DISABLED SOLDIER AND SAILOR SHOULD KNOW

That the Government is resolved to do its best to restore him to health, strength, and self-supporting activity.

That until his discharge from hospital care the medical and surgical treatment necessary to restore him to health and strength is under the jurisdiction of the Military or Naval authorities.

That the vocational training which may be afterwards necessary to restore his self-supporting activity is under the jurisdiction of the Federal Board for Vocational Education.

That if he needs an artificial limb or other orthopedic or mechanical appliance the Bureau of War-Risk Insurance supplies it free upon his discharge and renews it when considered necessary.

That if, after his discharge, he again needs medical treatment on account of his disability, the Bureau of War-Risk Insurance supplies it free.

That any man whose disability entitles him to compensation under the War-Risk Insurance Act may be provided by the Federal Board with a course of vocational training for a new occupation.

That the Government strongly recommends each man who needs it to undertake vocational training and put himself under the care of the Federal Board, but the decision to do so is optional with each man.

That if his disability does prevent him from returning to employment without training and he elects to follow a course of vocational training provided by the Federal Board, the course will be furnished free of cost, and he will also be paid as long as the training lasts a monthly compensation equal to the sum to which he is entitled under the War-Risk Insurance Act or a sum equal to the pay of his last month of active service, whichever is the greater, but in no case will

a single man or a man required by his course of instruction to live apart from his dependents receive less than $65 per month, exclusive of the sum paid dependents; nor will a man living with his dependents receive less than $75 per month, inclusive of the sum paid to dependents.

That if his disability does not prevent him from returning to employment without training and he elects to follow a course of vocational training provided by the Federal Board, the course will be furnished free of cost to him, and the compensation provided by the War-Risk Insurance Act will be paid to him, but no allowance will be paid to his family.

That in addition to the above the family or dependents of each disabled man will receive from the Government during his period of training the same monthly allotment and allowance as that paid prior to his discharge from the Army or the Navy.

That upon completion of his course of training he will continue to receive the compensation prescribed by the War-Risk Insurance Act so long as his disability continues.

That in nearly every case, by following the advice and suggestions of the Federal Board, he can either get rid of the handicap caused by his disability or acquire new powers to replace any that may have been lost.

That if he is willing to learn and to take advantage of the opportunities to increase his skill offered him by the Federal Board he can usually get a better position than he had before entering the Service.

That if he fails to take advantage of these opportunities he will find himself badly handicapped when he is obliged to compete with the able-bodied men who come back to work after the war.

That the Federal Board, through its vocational experts, will study his particular disability and advise him as to the proper course to pursue and give him free training for the occupation best suited to him.

That on the satisfactory completion of his training the Federal Board, through its employment service, will assist him to secure a position.

That public authorities and other large employers will in many cases, at least, give the disabled soldiers and sailors preference when filling vacant positions, provided they possess the training necessary to fill them.

All disabled soldiers, whether in or out of the hospital, should address their communications either to the Federal Board for Vocational Education, Washington, D. C., or to the district office of the Federal Board of the district in which he is located. The district offices of the Board are located at the following points, respectively:

District No. 1: Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island. Office: Room 433, Tremont Building, Boston, Mass.

District No. 2: Connecticut, New York, and New Jersey. Office: Room 711, 280 Broadway, New York.

District No. 3: Pennsylvania and Delaware. Office: 1000 Penn Square Building, Philadelphia, Pa.

District No. 4: District of Columbia, Maryland, Virginia, and West Virginia. Office: 606 F Street, N. W., Washington, D. C.

District No. 5: North Carolina, South Carolina, Georgia, Florida, and Tennessee. Office: Room 1404 Candler Building, Atlanta, Ga.

District No. 6: Alabama, Mississippi, and Louisiana. Office: 822 Maison Blanche Annex, New Orleans, La.

District No. 7: Ohio, Indiana, and Kentucky. Office: 906 Mercantile Library Building, Cincinnati, Ohio.

District No. 8: Michigan, Illinois, and Wisconsin. Office: 1600 the Westminster, 110 South Dearborn Street, Chicago, Ill.

District No. 9: Iowa, Nebraska, Kansas, and Missouri. Office: 517 Chemical Building, St. Louis, Mo.

District No. 10: Minnesota, North Dakota, and South Dakota. Office: Room 742 Metropolitan Bank Building, Minneapolis, Minn.

District No. 11: Wyoming, Colorado, New Mexico, and Utah. Office: 909 Seventeenth Street, Denver, Colo.

District No. 12: California, Nevada, and Arizona. Office: 997 Monadnock Building, San Francisco, Calif.

District No. 13: Montana, Idaho, Oregon, and Washington. Office: Room 539 Central Building, Seattle, Wash.

District No. 14: Arkansas, Oklahoma, and Texas. Office: 810 Western Indemnity Building, 1000 Main Street, Dallas, Texas.

COUNCIL BUSINESS

A. PH. A. COUNCIL LETTER NO. 13.

(*Concluded from p. 340, April issue.*)

The following communication has been received from Julius A. Koch, Chairman of Committee on Finance:

"The account for printing, postage and stationery, and that of the JOURNAL, have been overdrawn. I wish to submit a motion to the Council that additional appropriations for $118.03 for printing, postage and stationery, and for $80.06 for the JOURNAL be authorized."

Motion No. 18 (*Additional Appropriations for Printing, Postage and Stationery, etc.*). Moved by J. A. Koch, seconded by W. B. Day, that an additional appropriation of $118.03 for printing, postage and stationery and for $80.06 for the JOURNAL be authorized.

Motion No. 19 (*Election of Members*). You are requested to vote on the following applications for membership:

No. 70. Paul Edward Nielsen, Railroad and Washington Aves., Hillsdale, N. J. rec. by W. H. McNeil and H. M. Whelpley.

No. 71. Werner F. Wilhelm, 244 W. 73rd St., Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 72. Miss Margaret Ritchie, 77½ So. 10th St., Newark, N. J., rec. by Edward A. Wickham and Edward A. Sayre.

No. 73. Howard Andrew Krumwiede, 620 Decatur St., Brooklyn, N. Y., rec. by Edward A. Wickham and Edward A. Sayre.

No. 74. Stephen C. Hartman, 126 Gaylor Ave., Plymouth, Pa., rec. by J. D. Morgan and J. W. England.

No. 75. William Edwards, 390 So. River Street, Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 76. C. H. Ahrendts, 30 Metcalf Street, Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 77. Arno William Fritschel, 5740 S. Carpenter St., Chicago, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 78. P. Ellsworth Johnson, 404 So. Ashland Blvd., Apt. 2, Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 79. Gerald Litton McDaniel, 1625 W. Van Buren St., Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 80. Maurice B. Skelton, 4545 Michigan Ave., Chicago, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 81. Harold V. Jones, Cowden, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 82. Robert Lyle Bane, 701 South Wood Street, Chicago, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 83. Henry Morris, Michigan Ave. at Grand, Lansing, Mich., rec. by Charles H. LaWall and Wm. B. Day.

No. 84. Raphael Glass, 35 Poplar Street, Philadelphia, Pa., rec. by Ivor Griffith and J. W. England.

No. 85. Howard Wells Bangert, 1901 Belmont Ave., Chicago, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 86. Miss Libbey Dedic, 3519 W. 26th Street, Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 87. Sister Mary Wilhelmina, c/o St. Mary of Nazareth Hosp., 1120 No. Leavitt St., Chicago, Ill., rec. by Wm. B. Day and E. N. Gathercoal.

No. 88. Quintus Elton Carter, Bellville, Texas, rec. by R. H. Walker and E. G. Eberle.

No. 89. Charles Vail Netz, 321 12th Ave., S. E., Minneapolis, Minn., rec. by Charles H. Rogers and F. J. Wulling.

No. 90. Margaret O'Connell, 1009 University Ave., S. E., Minneapolis, Minn., rec. by Charles H. Rogers and F. J. Wulling.

No. 91. Victor Alfred Elliott, 2908 Arthington St., Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 92. Minot E. Gray, 23 N. Main Street, Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 93. Mark Burke, 19 So. Washington St., Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 94. Dr. Aston H. Morgan, 361 E. Market St., Wilkes Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 95. R. Ramsay Mebane, 308 E. Northampton St., Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 96. W. S. Durbin, 805 Wyoming Ave. Dorranceton, Pa., rec. by J. D. Morgan and J. W. England.

No. 97. James P. Rooney, 355 So. River St., Wilkes-Barre, Pa., rce. by J. D Morgan and J. W. England.

No. 98. Henry C. Tuck, 10 W. Market St., Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 99. Howard Dinsel, 32 Main Street Kingston, Pa., rec. by J. D. Morgan and J. W. England.

No. 100. H. L. Gillespie, 407 N. Main Street, Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 101. Leo Kijanski, 114 N. Main Street, Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 102. Edw. C. Mazanaski, 439 Main Street, Kingston, Pa., rec. by J. D. Morgan and J. W. England.

No. 103. Theodore Meyers, 674 Wyoming Ave., Dorranceton, Pa., rec. by J. D. Morgan and J. W. England.

No. 104. E. Arthur Aston, 453 No. Main St., Wilkes-Barre, Pa., rec. by J. D. Morgan and J. W. England.

No. 105. Harold G. Baird, 523 W. 120th St., Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 106. Maurice Axe McClure, 501 E. Girard Ave., Phila., Pa., rec. by Charles H. LaWall and E. G. Eberle.

No. 107. August Calderaro, 541 Bermuda St., Algiers, New Orleans, La., rec. by R. F. Grace and Adam Wirth.

No. 108. John B. Murphy, Pelican and Pacific Aves., Algiers, New Orleans, La., rec. by R. F. Grace and Martial B. Casteaux.

No. 109. Louis Clarence Smith, 600 Elmira Ave., Algiers, New Orleans, La., rec. by Robert F. Grace and Frank J. Muccio.

No. 110. Albert N. Nutter, 2300 Marengo St., New Orleans, La., rec. by Robert F. Grace and Frank Calderon.

No. 111. Frank M. Callaghan, 600 Pelican Ave., Algiers, New Orleans, La., rec. by Robert F. Grace and Henry Welsch.

No. 112. Joseph Allen Swanson, 5259 N. Clark Street, Chicago, Ill., rec. by C. A. Storer and Wm. B. Day.

No. 113. R. M. Plummer, 260 Third Street, Portland, Oregon, rec. by H. C. Christensen and Wm. B. Day.

No. 114. Lewis Paul Brockhoff, 1269 W. 73rd Street, Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 115. Karl W. Frase, 2118 So. Halsted Street, Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 116. Frank Prassel, 902 Nolan Street, San Antonio, Texas, rec. by Wm. B. Day and J. W. England.

No. 117. Edmund Bodinus, 2520 Cedar St., Milwaukee, Wis., rec. by E. N. Gathercoal and Wm. B. Day.

No. 118. Cyrus L. Cox, Science Hall, Valparaiso, Ind., rec. by Mrs. H. S. Carpenter and E. H. Wisner.

No. 119. Benjamin Steinhardt, 561 Ingraham Ave., Hammond, Ind., rec. by Mrs. H. S. Carpenter and E. H. Wisner.

No. 120. Nathan Kartman, 1840 S. Kedzie Ave., Chicago, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 121. James Bernard Humma, 513 Girard Ave., Metropolis, Ill., rec. by E. N. Gathercoal and Wm. B. Day.

No. 122. Ray M. Parker, 2521 Floyd Avenue, Richmond, Va., rec. by Charles F. Walker and W. F. Rudd.

No. 123. Eugene C. Wilson, c/o Medical College of Virginia, Richmond, Va., rec. by Charles F. Walker and W. F. Rudd.

No. 124. Thomas Fairfax Martin, Tazewell, Virginia, rec. by C. F. Walker and W. F. Rudd.

No. 125. Hypolite E. Capdau, Cor. 8th and Howard Sts., New Orleans, La., rec. by Robert F. Grace and F. C. Godbold.

No. 126. Lucius C. Baudin, R. R. Avenue, Donaldsonville, La., rec. by Robert F. Grace and Joseph A. Legendre.

J. W. ENGLAND, *Secretary*.

415 N. 33RD STREET.

A. PH. A. COUNCIL LETTER NO. 14.

PHILADELPHIA, PA., March 17, 1919.

To the Members of the Council:

The following motion has been presented:

Motion No. 20 (Investment of Ebert Prize Fund). Moved by J. A. Koch, seconded by H. M. Whelpley, that the Ebert Prize Fund, now amounting to $1,200.00, and on deposit in the Boston Penny Savings Bank, be invested in the Fourth Liberty 4 1/4 percent U. S. Bonds, to be purchased in the market at current price.

Early action on this motion will be appreciated so that if the purchase is to be made it can be done during the present low current price of these bonds.

J. W. ENGLAND,
415 NORTH 33RD STREET. *Secretary.*

A. PH. A. COUNCIL LETTER NO. 15.

PHILADELPHIA, PA., April 2, 1919.

To the Members of the Council:

Motion No. 17 (Time of Holding 57th Annual Meeting of the American Pharmaceutical Association), Motion No. 18 (Additional Appropriations for Printing, Postage and Stationery, etc.), Motion No. 19 (Election of Members; Applications Nos. 70 to 126, inclusive), and Motion No. 20 (Investment of Ebert Prize Fund), have each received a majority of affirmative votes.

President Charles H. LaWall writes to the Secretary of the Council as follows:

"Please place the following motion before the Council in the interest of making our meetings of greater value and to bring our procedure into harmony with that of other scientific associations:

'That at the Section meetings of the Association no paper or address be permitted to occupy more than 10 minutes, except by unanimous consent, and that discussion be limited to not over five minutes for each participant, and that no person be permitted to speak twice upon a given subject except by unanimous consent.'

One has but to attend the meetings or read the discussions of some of the other associations to note the vim and snap which follows the adoption of such rules. If we once start this practice we shall find ourselves accomplishing much more than we have ever been able to accomplish before."

The above motion was made by C. H. LaWall and seconded by E. G. Eberle. It will be known as *Motion No. 21 (Time of Paper and Address at Section Meetings).* If passed it will be regarded as a general rule and will be General Rule No. 17.

E. G. Eberle moves and E. N. Gathercoal seconds that the General Secretary be authorized to make the following disposition of the Association property received by him from Professor Lloyd and listed in Council Letter No. 12, pages 24 and 25:

1. *Retain* 50 copies of *each issue* of the Proceedings up to and including 1910 (so far as this number is available).

2. Retain 100 copies of the 1911 Proceedings (practically a year book) and 200 copies of *each issue* of the Year Book.

3. Retain the 80 bound copies of the 50-year Index.

4. Retain all stock of the N. F. III.

5. Retain all *bound* volumes of the Bulletin and Journal.

6. Retain the unbound copies of the Bulletin and Journal listed in the tabulations in Council Letter No. 12.

7. Retain all *bound* volumes among the *exchanges.*

8. Supply the unbound drug journals among the exchanges to such colleges of pharmacy as may need them to complete their files.

9. That such parts of the historical material as can be stored by the historian be turned over to him and the remainder be stored with the publications.

10. That the old electros be sold for their value as metal.

11. Dispose of the remainder for its value as paper.

12. Offer sets of the 5 Year Books, 1912–1916, inclusive, at a reduced price of $10.00 for the set.

The above motion will be known as *Motion No. 22 (Authorization of General Secretary to Dispose of Association Property, etc.).*

Motion No. 23 (Election of Members). You are requested to vote on the following applications for membership:

No. 127. Lee Otis Donald, 500 North Ewing St., Dallas, Texas, rec. by J. M. Fletcher and R. H. Walker.

No. 128. Eugene Hughes Long, 117 North Adams St., Dallas, Texas, rec. by J. M. Fletcher and R. H. Walker.

No. 129. Eldridge Columbus Harrell, Dallas, Texas (present address U. S. S. Louisiana), rec. by J. M. Fletcher and R. H. Walker.

No. 130. Robert Smith Hopkins, Johnson's Pharmacy, East Radford, Va., rec. by Chas. F. Walker and W. F. Rudd.

No. 131. Fred W. Smith, Pres. Miss. State Board of Pharm., Poplarville, Miss., rec. by Robert F. Grace and J. N. Shirley.

No. 132. August Schoenenberger, 1123 Centre Street, Ashland, Pa., rec. by Charles H. LaWall and J. W. England.

No. 133. Harold Morgan Lyon, 602 S. Chestnut St., Ravenna, Ohio, rec. by Azor Thurston and Edward D. Davy.

No. 134. William Watts Schollenberger, 2124 Cliftwood Avenue, Baltimore, Md., rec. by S. L. Hilton and Redmond Mayo.

No. 135. Rupert Richard Townsend, Glenwood, Pike Co., Ark., rec. by M. H. Potter and Frank Schachleiter.

No. 136. James O'Brien Condra, 148 W. Spring St., Titusville, Pa., rec. by C. H. LaWall and J. W. England.

No. 137. Earl K. Eberly, 1700 Mt. Vernon St., Philadelphia, Pa., rec. by W. W. McNeary and E. G. Eberle.

No. 138. John Hoskins Kennedy, 2935 Utah St., San Diego, Cal., rec. by J. W. England and E. G. Eberle.

No. 139. John Noble Lawrence, Hospital Corps Training School, Naval Operating Base, Hampton Roads, Va. rec. by J. W. England and E. G. Eberle.

No. 140. Maur George Gold, 1902 South 5th St., Philadelphia, Pa., rec. by C. H. LaWall and J. W. England.

No. 141. Benjamin Baker, 520 Delancey St., Philadelphia, Pa., rec. by William L. Friedman and C. H. LaWall.

No. 142. Michael Pachuta, 204 East Ave., Mt. Carmel, Pa., rec. by William L. Friedman and Charles H. LaWall.

No. 143. Otto L. Koenig, Jr., 4819 N. Mervine Street, Philadelphia, Pa., rec. by William L. Friedman and Charles H. LaWall.

No. 144. John C. Helmsderfer, 35 Louis Ave., Cincinnati, Ohio, rec. by Charles A. Apmeyer and Louis Werner.

No. 145. Ernst Stahlhuth, 522 N. New Jersey St., Indianapolis, Ind., rec. by Frank H. Carter and Francis E. Bibbins.

J. W. ENGLAND,
415 NORTH 33RD STREET. *Secretary.*

A. PH. A. COUNCIL LETTER NO. 16.

PHILADELPHIA, PA., April 22, 1919.

To the Members of the Council:

Motion No. 21 (*Time of Papers and Addresses at Meetings*) has been withdrawn, as the by-laws of the Association (Chapter X, Article II), and of the Scientific Section (Section IX) cover the subject matter of the Motion.

Motions No. 22 (*Authorization of General Secretary to Dispose of Association Property, etc.*) and *Motion No. 23*, (*Election of Members; Applications Nos. 127 to 145, inclusive*), have each received a majority of affirmative votes.

General Secretary Day writes:

"The National Association of Boards of Pharmacy now has permanent quarters and is establishing a library.

Secretary Christensen has called my attention to the fact that the following numbers of the Proceedings of the A. Ph. A. are needed to complete their set: All prior to 1906, 1907 and 1908, Year Books for 1914 and 1916.

I desire to offer a motion before the Council that the Association present with its compliments these proceedings to the National Association of Boards of Pharmacy so far as we are able to supply them without breaking the complete set of proceedings which I am holding for the Association itself."

The above motion will be regarded as *Motion No. 24* (*Presentation of Proceedings to N. A. B. P.*); it is seconded by E. G. Eberle.

H. V. Arny writes as follows:

"In voting 'yes' on Motion No. 22, I desire to file a supplementary motion, which is seconded by W. B. Day, as follows:

Moved that the General Secretary retain 20 copies of bound Year Books, I to V, and that as soon as conditions permit, sets of these five volumes be sent to leading pharmaceutical journals with the compliments of the American Pharmaceutical Association, the preparation of the list to be left to the General Secretary, the Editor and the Reporter.

As already explained in private letters to the Committee on Publication, my object in making this motion is to pave the way for a possible enlargement of the exchange list of the JOURNAL, at the same time bringing to the Reporter on the Progress of Pharmacy more journals for abstracting. Whether we should include Teuton journals in our complimentary list is a matter regarding which I am not decided, but I think the matter can be safely left to those making up this list of journals."

The above motion will be regarded as *Motion No. 25 (Presentation of Complimentary Volumes of Year Books to Foreign Journals)*.

Motion No. 26 (Election of Members). You are requested to vote on the following applications for membership:

No. 146. Edwin C. Steinach, 776 Melrose Ave., New York, N. Y., rec. by J. L. Lascoff and A. Henning.

No. 147. Stephen Wierzbicki, U. S. Naval Hospital, 263 Flushing Ave., Brooklyn, N. Y., rec. by P. J. Waldner and C. Schaffer.

No. 148. William Mayze Benton, 246 75th Street, Brooklyn, N. Y., rec. by P. J. Waldner and C. Schaffer.

No. 149. Edward G. Dennis (Lieut. M. C., U. S. Navy), Naval Training Station, Naval Operating Base, Hampton Roads, Va., rec. by J. W. England and E. G. Eberle.

No. 150. Harry M. Sorowitz, 1703 Washington Ave., New York, N. Y., rec. by Hugo H. Schaefer and Jacob Diner.

No. 151. C. J. Zufall, 641 Washington St., New York, N. Y., rec. by H. M. Whelpley and J. W. England.

No. 152. Charles J. Klitsch, 129 Sunbury St., Minersville, Pa., rec. by Charles H. LaWall and J. W. England.

No. 153. Samuel Green, 6140 Lansdowne Ave., Philadelphia, Pa., rec. by Wm. L. Friedman and C. H. LaWall.

No. 154. Rose Moran, 5450 Angora Terrace, Philadelphia, Pa., rec. by Wm. L. Friedman and C. H. LaWall.

No. 155. Allen Hornberger Fasnacht, 1321 Ruby St., Philadelphia, Pa., rec. by Wm. L. Friedman and C. H. LaWall.

No. 156. Hyman Jaffe, 3212 W. Dauphin St., Philadelphia, Pa., rec. by Wm. L. Friedman and C. H. LaWall.

No. 157. Andrew Edward Roedel, 312 N. 17th St., Cheyenne, Wyo., rec. by O. A. Beath and Wm. B. Day.

No. 158. Harry O. Mayer, Box 133, Sheffield, Pa., rec. by Charles H. LaWall and Wm. L. Friedman.

No. 159. Ralph Richard Foran, 145 N. 10th St., Philadelphia, Pa., rec. by Charles H. LaWall and Freeman P. Stroup.

J. W. ENGLAND,
415 NORTH 33RD STREET. *Secretary.*

"UP TO THE CUSTOMER" AGAIN.

The government, of course, will frown upon any extortion practiced in connection with the luxury tax, which became operative on May 1. Dealers who base profiteering on a misrepreresentation of the new impost burden will be subject to a fine of $1000 or a year's imprisonment.

But the measure of protection thus afforded the public is somewhat more apparent than real. "It is up to the customer," declares Congressman Moore, "to see that he or she is not deceived." And therein lies the weakness of this irritating law. It was "up to the customer" in the first instance to see that food prices during the war were not exorbitant. Yet they were so, for it was no easy matter for the ordinary layman to tell whether or not, considering all the conditions of labor and transportation, he was being cheated.

He will be no wiser when the luxury vendor grows imperious. The fact that the law provides punishment if guilt is proved will not be helpful unless the average citizen is competent to bring the initial charge.

Theoretically, a tax on luxuries has a foundation of justice. Practically, the administration of the impost is bound to be complicated, with inequities hard to unravel. A tax on bank checks would have involved none of these difficulties. Obviously the labyrinthine congressional mind which rejected that plan was awed by the very simplicity of so fair and easy an expedient for raising money.—Editorial, *Philadelphia Public Ledger*.

OPTIMISM.

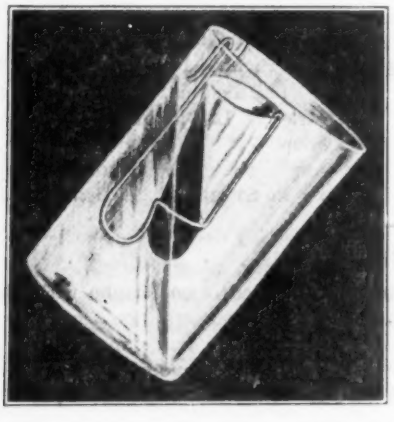
"It is just as easy to go through life looking for the good and the beautiful, instead of the ugly; for the noble instead of the ignoble; for the bright and cheerful instead of the dark and gloomy; the hopeful instead of the despairing; to see the bright side instead of the dark side. To set your face always toward the sunlight is just as easy as to see always the shadows, and it makes all the difference in your character between content and discontent, between happiness and misery, and in your life, between prosperity and adversity, between success and failure."
—Orison Sweet Marden.

EDITORIAL NOTES

Editor: E. G. EBERLE, Bourse Building, Philadelphia, Pa.
Committee on Publication: J. W. ENGLAND, *Chairman;* G. M. BERINGER, CASWELL A. MAYO, H. B. MASON, E. L. NEWCOMB, and the Editor-in-Chief of the JOURNAL, General Secretary, Treasurer and Reporter on the Progress of Pharmacy, *ex-officio.*

DEGLUTITORY CUP.

A deglutitory cup is described in a recent issue of the *Scientific American.* It is an arrangement whereby it is possible to swallow medicines without experiencing any disagreeable taste. A small cup is provided which is held in a wire clip that may be attached to the rim of a tumbler in the manner shown in the accompanying illustration. The tumbler is



first partly filled with water and then the cup with the medicine in it is fitted to the tumbler. The patient merely drinks the water in the glass and at the same time the medicine flows out and, floating on the film of water, is kept from coming into contact with the tongue. Not only liquid medicines, but capsules, pills and powders can be taken in this way.

WATER-ABSORBING CAPACITY OF DUSTING POWDERS.*

By TORALD SOLLMANN, M.D., Cleveland.

The value of dusting powders is determined partly by their capacity for absorbing or retaining excessive fluid, for example, from the skin, from open wounds, from the intestine in dysentery, etc.

RELATIVE WATER CAPACITY OF DUSTING POWDERS, ARRANGED IN ORDER OF EFFECTIVENESS.

Powder Tested.	Weight of Water Held by 3 Gm. of Powder.	Retained Water as Percent of the Powder
Starch (corn)	2.39	80
Kaolin	2.19	73
Fullers' earth	2.09	70
Precipitated calcium carbonate	1.94	65
Talcum	1.84	61
Prepared chalk	1.59	53

PHARMACEUTICAL EDUCATION IN GERMANY.

According to Dr. H. Zoernig, Basel, Switzerland, pharmaceutical education in Germany will, in all probability, be arranged as follows: After passing a school-leaving examination (which may or may not be matriculation) the student will spend an apprenticeship of two years in a pharmacy and then pass to a three years' course of study at a University. This course will be divided into two parts; first a year and a half devoted to general science, followed by an examination in the same, and succeeded by a year and a half devoted to special pharmaceutical study, and followed by the State pharmaceutical examination. The general science course will be similar to that followed by students of medicine and natural science, though there may be variation in the subjects taken. The special pharmaceutical course will include pharmaceutical chemistry, chemical toxicology, urine analysis, the chemical examination of foods, pharmacognosy, hygiene, and bacteriology. After the State examination has been passed, several years will be spent as an assistant in a pharmacy, and the assistant will then be approved as fully qualified.—Abstracted by *Pharmaceutical Journal* from *Pharm. Ztg.*, Vol. 63, p. 382.

* From the Pharmacological Laboratory of the Western Reserve University School of Medicine, through *Journal A. M. A.*

FELLOWSHIPS FOR PHYSICS AND CHEMISTRY.

"The Rockefeller Foundation has undertaken to coöperate with the National Research Council in the promotion of fundamental research on physics and chemistry, the Foundation to appropriate $500,000 to support over a five-year period research fellowships, the administration of the funds and details of the plan to be in the hands of the National Research Council.

"Among the important results which are expected to follow from the execution of the plan may be mentioned:

"(1) Opening of a scientific career to a larger number of able investigators and their more thorough training in research, thus meeting an urgent need of our universities and industries.

"(2) Increase of knowledge relating to the fundamental principles of physics and chemistry, upon which the progress of all the sciences and the development of industry depend.

"(3) Creation of more favorable conditions for research in the educational institutions of this country."

SIR WILLIAM CROOKES.

Sir William Crookes was born June 17, 1832; he died in London, the city of his birth, April 4, 1919. While not associated with pharmacy, his work in science suggests this record. He was an honorary member of the British Pharmaceutical Society.

In 1861, while examining the residue from the manufacture of sulphuric acid, he discovered by means of spectrum observations and chemical reaction a new element, the metal thallium. He also determined the new metal's position among the elements, and produced a series of analytical notes on the new metal. In 1866 he was appointed by the British government to report upon the application of disinfectants in arresting the spread of the cattle plague, which in that year excited much alarm in England. In June, 1872, he laid before the Royal Society laborious researches on the atomic weight of thallium, and in the same year he began his experiments on "repulsion resulting from radiation," the first paper on which subject he read before the Royal Society on December 11, 1873.

During the period between 1873 and 1880 Crookes conducted a series of investigations of the subject of radiation and invented two valuable instruments, the radiometer and the otheoscope. In a paper read by him before the Royal Society in 1877, he reported that he had succeeded in obtaining a vacuum so nearly approaching perfection that the pressure in it was only four-tenths of the millionth part of one atmosphere. He found that in such an extreme vacuum gases pass into an ultra-gaseous state and form "radiant matter." It was his invention of producing extreme vacua which made possible the incandescent lamp and led to the discovery of the Roentgen rays and the X-ray methods of examination of living tissue, and later to the treatment of certain diseases by means of cathode rays. Since 1883 Mr. Crookes confined himself almost exclusively to the investigation of the nature and constitution of rare earths.

NATIONAL CAMPAIGN EDUCATION OF THRIFT.

The Treasury Department has inaugurated a national campaign of education in thrift. This campaign is being developed through the occupational and social groups of this country.

The campaign has as its main objective to make thrift a national habit and thus benefit every individual in the country and the nation at large. When thrift becomes a habit, business will be stabilized as never before. The aid of organizations is asked in this work on a purely business basis, as well as from the standpoint of practical patriotism.

THE FUTURE OF ALCOHOL.

In the opinion of the Deputy Commissioner of Internal Revenue, when the people of the United States stop drinking alcohol, it will come into its own as a chemical, industrial and fuel agent. Germany, prior to the war, had reached a production of approximately 200,000,000 gallons of grain alcohol a year, while the maximum production in the United States at that time had barely reached 35,000,000 gallons, and even in the stimulated demand of the war the figures were not quite 100,000,000 gallons. With the impetus given to chemical industry in this country, together with the normal increase of consumption in a score or more producing industries, the Internal Revenue official is confident that the distilleries need not be scrapped, but can be converted to useful and profitable service.

There are doubtless great possibilities in the industrial alcohol business but the Government must give encouragement. It is ques-

tionable whether the use can be greatly extended under present taxation. Alcohol used for manufacturing purposes should be tax-free or nearly so, and the use of such alcohol extended to the manufacture of pharmaceuticals.

SOCIETIES AND COLLEGES.

THE NINETEEN NINETEEN MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The sixty-seventh annual convention of the American Pharmaceutical Association will he held in New York City during the week of August 25, headquarters in Hotel Pennsylvania; the address of Local Secretary Hugo H. Schaefer is 115 W. 68th St., New York.

The American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will convene August 25, holding further sessions during the week.

The tentative program of these conventions is printed in the April issue of the JOURNAL A. PH. A., p. 340. Your attention is also again directed to the announcements under Societies and Colleges, p. 346 of the same number.

This is to be the "Victory Meeting" of the American Pharmaceutical Association; the conditions which reduced the attendance during the past few years no longer obtain. Preparations are to be made for the revision of the U. S. Pharmacopoeia and the National Formulary; the new edition of the Pharmaceutical Syllabus is well under way; the aim to bring about closer relations with State Associations and the House of Delegates, and extend the possibilities of the National Drug Trade Conference, is being activated.

Contributors of papers should notify the chairmen of the respective Sections of the titles, and send in their papers as early as possible, so that the programs can be prepared in advance of the meeting. Every member can help to make this the most successful meeting in the history of the American Pharmaceutical Association.

CONFERENCE OF WEIGHTS AND MEASURES OFFICIALS.

Weights and measures officials from all over the United States are to hold a conference from May 21 to May 25 at the U. S. Bureau of Standards.

The objects of these conferences are to bring about an exchange of views between the officials engaged in inspecting and measuring apparatus throughout the country and thereby obtain greater efficiency and uniformity in the work.

The coming conference will be presided over by Dr. S. W. Stratton, director of the U. S. Bureau of Standards, who is president of the Association. Maj. L. A. Fisher, chief of the weights and measures section of the Bureau of Standards, is secretary of the Association; Leo S. Schoenthal, chief inspector of the District of Columbia, is a member of the Executive Committee.

THE FUTURE OF ALCOHOL MEDICINALS.

Secretary W. J. Woodruff, of the American Drug Manufacturers' Association, spoke on the above subject during the recent convention and said in part as follows:

"So far as alcohol is concerned, of course it is absolutely *sine qua non* in the production of most chemicals and most isolated substances in solid or powdered form; while without it fluidextracts and tinctures could not be produced.

"On the other hand, there are many mixtures for which substitutes in the way of syrups, glyceroles and other pharmaceutical forms can be, and in many cases are, provided.

"Respecting these features, legislators need enlightenment. If prohibition is to remain the policy of the country at large—and it appears we must proceed upon this calculation—then the sale of some medicinal preparations certainly must be regulated. As manufacturers, we cannot shut our eyes to the fact that certain preparations, even those recognized in the United States and other accepted Pharmacopoeias, are being perverted to satisfy the appetite for alcohol. There are fellow-members present here to-day who can tell you of having offended valuable customers by refusing them Beef, Iron and Wine, Hoffmann's Drops, Godfrey's Cordial and other similar preparations in abnormal quantities.

"Manufacturing pharmacists are between the devil and the deep blue sea. The proprietary medicine man selling his products for self-medication and depending upon a demand he has created or can create is free to choose

what form of preparation he will offer to the public for self-medication; the retail druggist, while necessarily obliged to fill physicians' prescriptions written in good faith, is not obliged to sell an alcoholic medicinal preparation for purposes of self-medication. There are many such products of equal value which do not contain alcohol and which do not contain habit-forming narcotic drugs which will afford him just as much profit; but with the manufacturing pharmacist it is different. He offers nothing to the public for self-medication and he cannot put himself in the presumptuous position of dictating to the medical practitioner what shall be prescribed in a particular case. We have a letter written within the last ten days from one of the foremost therapeutists of the country, pointing out the fact that very many of the most reputable physicians in the country recognize the therapeutic value of alcohol. Manufacturing Pharmacy must take a broad stand. It cannot confine its operations to the views of a narrow-minded faction of physicians; and it must be free to supply those alcoholic medicinal preparations which a considerable number of reputable physicians prescribe in good faith. This situation is recognized in what is now the fundamental law of the United States of America upon the subject of prohibition. It is recognized at the present time in the laws of most of the states and it should be recognized by our legislatures and our courts.

"At the same time Manufacturing Pharmacy cannot go to the extreme which some interests would like to have us go to; it must not put itself in the position of antagonizing reasonable measures to control the sale of alcoholic medicinal preparations so as to prevent the use of such preparations for beverage purposes; especially when the necessity of such regulation has been demonstrated, as it has since prohibition laws went into general effect.

"Our work must therefore be constructive and with the sole end in view of saving to medical practitioners, whose servitors we really are, the right to prescribe and administer those therapeutic agents which their observation and experience and their knowledge of particular cases under treatment convince them are indicated. It is hoped this discussion will be along these lines and will result in some concrete action which will tend to a just conclusion of the whole matter and set the question at rest for all time."

STATE PHARMACEUTICAL ASSOCIATION MEETINGS.

The Arizona Pharmaceutical Association met in Phoenix April 9–10.

The California Pharmaceutical Association will meet in May. The Kansas Pharmaceutical Association will convene May 13, for a three days' session. The Louisiana Association will meet May 14.

The New Jersey and Texas Associations will open their sessions on June 10; the Florida Association June 11. The Illinois, Kentucky, Massachusetts and Nebraska Associations will meet on June 17. The Alabama Association convenes June 18. The New York Association meets on June 23, and the North Carolina, Pennsylvania and Wisconsin Associations on June 24.

ANNUAL MEETING OF PROPRIETARY ASSOCIATION OF AMERICA.

The thirty-seventh annual meeting of the Proprietary Association of America was held at the Hotel Astor, New York City, April 8 and 9.

The Committee on Requirements for membership of this Association has its existence and authority under an amendment to the constitution adopted at the annual meeting in 1915. These requirements demand that preparations must come within the definition of the law as to alcohol and narcotic content. The paragraph relating to alcohol reads:

"If the preparation contains alcohol, the amount shall not be greater than is properly necessary to hold in solution in permanently active condition the essential constituents of the preparation and to protect against freezing, fermentation or other deleterious change, and the medication shall be sufficient to render the preparation unsuitable as an intoxicating beverage."

The following resolution was adopted:

"Such bills as may be introduced for the enforcement of the prohibition of the sale of intoxicating liquors shall provide that alcoholic preparations which are unsuitable for use as beverages may be sold without permits, registration or other restriction."

All the officers were re-elected; they are:

President, Frank A. Blair, of Chicago.

First Vice-President, W. H. Gove, of Lynn, Mass.

Second Vice-President, Allen F. Moore, of Monticello, Ill.

Secretary-Treasurer, Charles P. Tyrrell, of Syracuse, N. Y.

General Counsel, H. B. Thompson, of Chicago.

OFFICERS RHODE ISLAND PHARMACEUTICAL ASSOCIATION.

The officers for 1919–1920 of Rhode Island Pharmaceutical Association are:

President, M. H. Corrigan, of Providence.

Vice-President, Earl H. Mason, Ph.D.

Secretary, C. E. Barrett, of Providence.

Treasurer, Frank M. Keighley.

Committees appointed are:

Entertainment: J. A. Kiernan, Paul C. Broderick and Wallace R. Fenner.

Executive: J. P. McDonald, Walter J. Batchelder and B. A. Smith, Jr.

OFFICERS OKLAHOMA PHARMACEUTICAL ASSOCIATION.

The newly elected officers of the Oklahoma Pharmaceutical Association are:

President, Lee Drummond, Dewar.

First Vice-President, Don Friday, Cushing.

Second Vice-President, E. E. Cowan, Sapulpa.

Secretary, A. L. Shackelford, Wynnewood.

Assistant Secretary, F. B. Lillie, Guthrie.

The next meeting will be held at Muskogee, the second week of April 1920.

OFFICERS OF THE MICHIGAN PHARMACEUTICAL ASSOCIATION.

The officers of the Michigan Pharmaceutical Association for 1919–1920, are:

President, C. E. Wilkinson, Lansing.

First Vice-President, Arthur G. Lyons, Coldwater.

Second Vice-President, P. J. Mattson, Grand Rapids.

Treasurer, Carl H. Wheeler, Grand Rapids.

Secretary, F. J. Wheaton, Jackson.

Executive Committee, E. W. Austin, Midland; G. H. Grommet, Detroit; D. D. Alton, Fremont; J. G. Steketee, Grand Rapids; D. G. Look, Lowell; J. A. Skinner, Cedar Springs; J. H. Webster, Detroit.

THE YEAR OF ALL YEARS FOR THE MISSOURI PHARMACEUTICAL ASSOCIATION.

Yes, and for the pharmacists of Missouri, whether or not they are members.

The entire world of human affairs is in the re-making. Pharmacy cannot escape the current of widespread events. Four decades of usefulness are on record for the Missouri Pharmaceutical Association, but an organization cannot live long on tradition.

It is the passing day that must be considered and utilized. The World War has emphasized the value of efficiency. It will no longer do to measure the success of an annual meeting by the size of the attendance, the nature of the entertainment, nor the amount of discussion. The accomplishments must be an existent fact, and demonstrate that the Mo. Ph. A. is helpful to the citizens and useful for the pharmacists of Missouri.

First of all, awaken a realization of the responsibility of being a pharmacist. Then better profits for the proprietor and higher salaries for the clerk will result.

Also raise the minimum of preliminary education in Missouri, so that the pharmacists themselves, as well as the public, will feel the dignity of the calling. The United States Army would have had a pharmaceutical corps before now if the rank and file engaged in compounding medicines measured up to the educational standard that the calling deserves.

And, lastly, emulate the example of trade organizations and give the members business talks, papers and discussions of problems immediately vital. Let each retailer return home feeling that the trip was a profitable one.

HENRY M. WHELPLEY,
April 28, 1919. *Secretary.*

ADVANCED ENTRANCE REQUIREMENTS FOR PENNSYLVANIA PHARMACY SCHOOLS.

At a meeting held recently in Philadelphia of the Deans of the three colleges of Pharmacy located in this State, it was unanimously decided that the entrance requirements for pharmacy should be advanced in accordance with the agreement of the colleges belonging to the American Conference of Pharmaceutical Faculties.

The following advances in entrance requirements were therefore agreed upon:

For the seasons of 1919–20 and 1920–21, not less than two years of high school or its equivalent.

For the sessions of 1921–22 and 1922–23, not less than three years of high school or its equivalent.

For the sessions of 1923–24 and thereafter, not less than four years of high school or its equivalent.

It is deemed advisable to give advance notice

of this step to the Pennsylvania Board of Pharmacy and to the pharmaceutical journals, in order that pharmacists may prepare for these changes by giving intelligent advice to young men and women contemplating the study of pharmacy so that they may be properly prepared when these advances go into effect.

J. A. KOCH,
Dean of the Pittsburgh College of Pharmacy.

JOHN R. MINEHART,
Dean of Dept. of Pharmacy, Temple Univ.

CHARLES H. LAWALL,
Dean of the Philadelphia College of Pharmacy.

THE PHARMACIST AND THE LAW.

REVENUE LAW OF 1918.

TENTATIVE REGULATIONS GOVERNING AMENDED HARRISON NARCOTIC LAW.

(*See also April Issue, p. 340.*)

Hospitals, educational institutions and similar organizations, as well as physicians, are required to register and pay a special tax at the rate of $3.00 a year. Institutions of the character named herein are permitted to dispense articles not specifically exempted by Section 6 only to persons being treated therein. Any dealings in packages or dispensing from packages to other persons will render the institution liable as either a wholesale or retail dealer, or both, as the case may be, and subject to the special tax governing those classes.

Physicians are permitted to dispense only to bona fide patients, and any sale or administration other than that provided will render the physician liable either as a wholesale dealer or as a retail dealer, or both, as the case may be, and subject to the special tax for those classes.

Manufacturers having branch houses and firms, or corporations operating more than one store, are required to take out a special license and pay special tax for each branch or each store.

General stores dealing only in preparations or remedies specifically exempted under Section 6 are required to register and pay a special tax at the rate of $1.00 a year.

RECORDS, ETC.

Records showing purchases and sales will be required of each class of registrant, and *records must not be combined if person is registered in more than one class.*

All persons manufacturing or selling any of the articles exempted from the tax by the terms of Section 6 are required to keep a record of their transactions in those articles. These records must show the name and quantity of the preparation or remedy purchased and sold; the name of person from whom purchased; the name and address of the person to whom sold, and the date of purchase and sale.

GOODS ON HAND FEBRUARY 25TH.

Wholesalers and retailers, as well as physicians, hospitals and educational institutions, should affix to every broken or unbroken individual bottle or other container of unstamped narcotic drugs and preparations not specifically exempted under Section 6, now in stock, their own label or pasters with the words "In Stock—Inventory as of February 25, 1919" thereon, and the intitals of the owner. This action is necessary to avoid possible seizure of the narcotic drugs and preparations which were on hand on that date. Collectors of Internal Revenue in some districts have held that revenue stamps must be placed on stocks on hand as of February 25, but this was an error.

ADHESIVE STAMPS FOR NARCOTIC PACKAGES.

The amended narcotic law imposes an internal revenue tax at the rate of 1 c. per ounce, and prescribes that any fraction of an ounce in a package shall be taxed as an ounce, such tax to be paid by the IMPORTER, MANUFACTURER, PRODUCER or COMPOUNDER, and to be represented by appropriate *stamps* which are to be affixed to the bottle or other container so as to securely seal the stopper, covering or wrapper thereof.

Adhesive stamps to be affixed to taxable narcotic packages have been issued by the Bureau to meet the requirements of the Harrison Narcotic Law, as amended. The initial supply consisted of documentary stamps overprinted with the word "Narcotic." These overprinted stamps will be in denominations of 1 c., 2 c., 4 c., 8 c. and 10 c. A combination of two or more such stamps may be made where necessary or expedient in stamping packages, until such time as new strip stamps are prepared and distributed.

RETAIL DEALERS—WHEN LIABLE AS MANUFACTURERS.

A retail dealer who compounds preparations containing more than an amount of narcotic drug specifically exempted under Section 6 of the law, as amended, does not incur liability as a manufacturer when, as a convenience, he compounds what may be termed "Stock Solutions" containing narcotic drugs which he intends to use solely in filling prescriptions. If a retail dealer removes from the container any quantity of the narcotic stock solution originally prepared for dispensing on prescriptions and places it in another container to sell on an order form, he incurs liability to tax as a manufacturer, producer, or compounder, and must pay the special tax at the rate of $24.00 a year, and affix to each container sold on order form a stamp denoting payment of tax of 1 c. on each ounce or fraction of an ounce of the narcotic solution.

RETAIL DEALERS—WHEN LIABLE AS WHOLESALERS.

The description "Wholesale Dealers" as those who sell in the original stamped packages and of "Retail Dealers" as those who sell from such packages, involves the question as to whether or not a retail dealer is liable to payment of tax both as a wholesale and retail dealer. If a retail druggist fills a prescription covering a large quantity of narcotic drugs by furnishing an original stamped package of it or to accommodate another dealer he furnishes one or more original stamped packages upon receipt of an order form, he would be liable to tax as a wholesale dealer. A retail dealer, therefore, may not sell original stamped packages unless he is also registered as a wholesale dealer.

PAYMENT OF TAX ON NON-EXEMPTED NARCOTIC DRUGS AND PREPARATIONS.

No matter how many times the narcotic drug or preparation may have been tax-paid, if it is used in the further manufacture of another preparation, which, in its finished state, does not come within the exemptions of Section 6, it is taxable every time a new product is manufactured. The tax of one cent for each ounce or for any fraction of an ounce in an individual container applies to the volume of any narcotic preparation or remedy not specifically exempted, and not on the narcotic drug alone contained in the preparation or remedy.

REVISED RULES AND REGULATIONS FOR FEDERAL FOOD AND DRUGS ACT TO BE DISCUSSED MAY 19.

A public hearing will be held by the officials in charge of the enforcement of the Federal Food and Drugs Act on Monday, May 19, 1919, at 10 A.M., in the Bureau of Chemistry, United States Department of Agriculture, Washington, to discuss a proposed revision of the rules and regulations for the enforcement of that act. All interested persons are invited to attend and present their views either orally or in writing.

Tentative revised rules and regulations have been prepared by the United States Department of Agriculture, which will form a basis for discussion. Views of the trade and other persons interested are desired in reference especially to the proposed changes, but recommendations for additional amendments or changes will be considered.

No drastic changes in the present regulations are contemplated, say the officials. Most of the proposed changes in wording are for the purpose of clarifying or making more specific regulations now in effect. Some minor modifications in the rulings have been made.

Copies of the tentative rules and regulations may be obtained by interested parties upon application to the Bureau of Chemistry, United States Department of Agriculture, Washington, D. C. Recommendations or suggestions may be made in writing on or before the date of the hearing.

"ADDICT" DEFINED UNDER NEW YORK STATE NARCOTIC LAW.

Dr. Royal S. Copeland, New York Commissioner of Health, has announced the following definition for drug addiction:

For administrative purposes, a person who requires or demands the daily administration of a narcotic drug for a longer period than three weeks shall be considered a drug addict; provided, however, that the attending physician may file with the New York Department of Drug Control a statement that the patient has an incurable disease or gives other sufficient professional reason for the continued use of the drug. In such a case the patient shall not be considered an addict.

ALCOHOL PROVISION OF NEW YORK ENFORCEMENT BILL REVISED TO MEET NEW YORK DRUG TRADE OBJECTIONS.

Revision by the New York anti-saloon league of its "enforcement" bill has materially changed the section affecting the drug trade.

Provision is made for the appointment by the commissioner of a committee of three physicians and two druggists who shall decide upon the basis of analysis made by the Department of Health, of suspected liquids, whether the same are in fact so medicated as to be incapable of beverage use. The druggist provisions are put into a separate section, likewise the provisions respecting physicians. The fee for a retail druggist in a place of 5,000 or less is reduced to $5, and in other places $10, while the fee for manufacturers or wholesale druggists remains at $10.

Several matters of detail that are already sufficiently covered by the general laws of the State have been omitted. Provision has been made to protect bona fide manufacturers of de-alcoholized wines. The cider feature has been made more explicit to permit pasteurization of apple juice or de-alcoholization.

The section authorizing possession of standard remedies has been recast in accordance with the suggestions of the Druggists' Associations.

OHIO PROPRIETARY RESTRICTIONS OFF.

Restriction on the sale of proprietary medicines and other remedies and commodities containing alcohol, as far as they affect the retail druggist in Ohio, have been removed. This is the announcement of Professor Edward Spease, chairman of the legislative committees of the Ohio State Pharmaceutical Association and the Northern Ohio Druggists' Association of Cleveland. The permit system which was to have regulated the sale of these goods was stricken from the prohibition measure by the house committee at Columbus this week. However, the permit system will apply to manufacturers.

NEW TEXAS LAW REGULATING ADVERTISEMENTS AND SALES OF "PATENT" MEDICINES.

Governor Hobby, of Texas, has signed the bill regulating sales of medicines. Section 3 of the law reads:

"It shall be unlawful to manufacture for sale, offer or expose for sale, sell or exchange, any drug, medicine or device advocated for the cure of diseases, if the package or label or any representation pertaining to same shall bear or contain any statement, design or device regarding the curative or therapeutic effect of such article or any of the ingredients or substances contained therein, which is misleading, false and fraudulent."

Section 5 of the bill vests the Food and Drug Commissioner and his inspectors with powers of a peace officer to enter into any factory, store, salesroom, drug store or laboratory, or place where he has reason to believe drugs are made, prepared, sold or offered for sale or exchange, and to examine the files and books of such places.

BOOK NOTICES AND REVIEWS.

Essentials of Pharmacy. By L. E. Sayre, PhG., Ph.M., Dean of the School of Pharmacy of the University of Kansas, and Professor of Pharmacy and Materia Medica, and L. D. Havenhill, Ph.C., Phar.M., Professor of Pharmaceutical Chemistry in the School of Pharmacy of the University of Kansas. 12mo. of 495 pages. Philadelphia and London: W. B. Saunders Company, 1918. Cloth, $2.75 net.

The authors of "Essentials of Pharmacy" state in the Preface that the object of the book is not to furnish an exhaustive treatise on pharmacy, but rather to give a simple, brief outline of the important pharmaceutical data in convenient arrangement, and to inspire the student to make free use of the U. S. Pharmacopoeia and National Formulary and other works of reference.

The subjects are discussed under six chapter headings: I, Introductory pharmacy, as general definitions, metrology, specific gravity, heat, thermometry, pharmaceutic processes and terms; II, Medicinal substances, chiefly inorganic chemicals; III, Organic chemicals; IV, Pharmaceutic preparations of the U. S. P. and N. F.; V, Incompatibility; VI, Toxicology. The arrangement under each division is alphabetic, for easy reference, and an Index is provided.

The vegetable materia medica has not been touched upon, mainly, the authors state, be-

cause it would increase the size of the volume beyond their desire, and because it constitutes a separate subject of sufficient importance to be treated independently.

A list of the U. S. P. and N. F. drugs, with brief definitions, would be of value in this reference book. It is questioned whether such abbreviations as g/m, m/m and m/g, as signifying, respectively, grammes per 100 mils of preparation, mils per 100 mils of preparation and mils per 100 grammes of preparation, should have been introduced. An abbreviation should not confuse, and in these instances the indication is not for 100 but for 1, also, these abbreviations are not so very different from abbreviations otherwise applied. The book is intended for students who are to be taught exactness. In the main, however, the authors have accomplished their purpose, and the book is useful for students and is convenient for reference. The definitions, though concise, are clear and instructive, and as a successor to the former Compend, the revision presents a marked improvement. The book is well bound and the typography and paper are good.

Squibc's Atlas of Official Drugs, including all the drugs official in the last revision of the U. S. Pharmacopoeia and National Formulary, with photographic cuts of each drug from original material, comprising 300 illustrations, average size $3^1/_2 \times 5$ inches. The title of each drug, abbreviation, English name, synonyms, botanical origin, part or parts used, permissible limits of impurities, assay, habitat, description and official preparations (if any) are given. Prepared by William Mansfield, A.M., Phar.D., dean and professor of Pharmacognosy and Botany, Albany College of Pharmacy. Published by E. R. Squibb & Sons, New York; 700 pages. Price, $2.00.

In the publication of this Atlas of Official Drugs a valuable service has been rendered and it will be welcomed by all who deal in, handle or study drugs. The engravings were made from photographs taken of selected market specimens, thus serving the purpose of a pictorial description of the drugs under consideration. The work involved in preparing these illustrations will be appreciated; they are all good, but in a series of photographs like these some, quite naturally, depict the subject better than others—some might have been improved if they had been retouched or lightened so as to better bring out characteristics. On a few of the plates, exhibiting seeds and fruits, the attempt has been made to show too many specimens. In a number of instances the cross sections indicate little more than outline.

While the illustrations with the descriptive matter of the drugs constitute the greater value and major part of the volume, other portions of the text matter are well presented and in such a way that it not only serves for reference but also as a pharmacognosy handbook.

The drugs are considered in groups, according to the part or parts used, roots, barks, etc., and the introduction to each chapter contains an explanation of the terms used in describing each class of drugs. Under each drug are given its title, abbreviation, English name, synonyms, botanical origin, habitat, part or parts used, description, assay, when provided, and official preparations, if any.

The publishers are to be commended for fixing a price for the Atlas which will insure a well-deserved large sale and use of the book.

PUBLICATIONS RECEIVED.

The Supplement to the United States Naval Medical Bulletin, published for the information of the Hospital Corps of the Navy. Issued by the Bureau of Medicine and Surgery, Navy Department, Division of Publications, Captian J. S. Taylor, Medical Corps, United States Navy, in charge. Edited by Lieutenant Commander G. F. Cottle, Med. Corps United States Navy. January, 1919 (Number 8).

Proceedings of the Nineteenth Annual Meeting of the American Conference of Pharmaceutical Faculties, held in Chicago, Ill., August 12–13, 1918.

Proceedings of the Forty-eighth Annual Convention of the New Jersey Pharmaceutical Association, held at Spring Lake, N. J., June 18–21, 1918.

Proceedings of the Thirty-fourth Annual Convention of the Minnesota Pharmaceutical Association, held at Minneapolis, February 6 to 8, 1918.

Proceedings of the Thirty-ninth Annual Convention of the Texas Pharmaceutical Association, held at Waco, May 21 to 23, 1918.

Fifty-eighth Annual Report of the Philadelphia Drug Exchange, for 1918.

Proceedings of the Forty-fourth Annual Meeting of the National Wholesale Druggists' Association, held in New York City, October 7–11, 1918. Contains also the reports of their committees and other data of interest and value. 600 pages, bound in cloth.

CHANGES OF ADDRESS.

All changes of address of members should be sent to the General Secretary promptly.

The Association will not be responsible for non-delivery of the Annual Volume or Year Book, or of the JOURNAL unless notice of the change of address is received before shipment or mailing.

Both the old and the new address should be given thus:

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To Residence Unknown.

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To 1100 Grand Ave., Kansas City, Mo.

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REED, J. G.
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RESIDENCE UNKNOWN.

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From 30 Humbolt St., Brooklyn, N. Y.

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